Light and LIGHTING

APRIL, 1937 PRICE 2s. 6d.

THE LIGHTING SERVICE BUREAU

appearance of different classes of goods er various types of lighting has been studied he Bureau by many trades. Here, confec- ers consider what is best for their mer- ndise.

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Light and LIGHTING

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contents

Lighting Abroad

FOR the third successive year we are presenting our international review of lighting, but now, for the first time, we publish the text in three languages. This innovation will doubtless be appreciated by our numerous and valued Continental readers. We have reason for believing that the prestige of this journal stands higher now than at any previous time in its history, not only in the English-speaking countries in which it circulates, but also in other countries. Naturally we are gratified that this should be so, but we are not complacent. Our aim is not only to maintain our reputation as an independent lighting journal of high standard, but to work constantly for its enhancement through well-chosen contents and good presentation. No one country has a monopoly of good ideas in applications of lighting; each has something to learn from others. We are always ready to publish information about interesting lightings abroad, but, at least once a year, the gathering together in one issue of many examples of what is being done internationally in, and relating to, lighting is a valuable feature. Every four years the Commission Internationale de l'Eclairage meets for the exchange of information about lighting developments everywhere, and its next meeting is to be in Belgium two years hence. Secretariats in different countries, and working parties of experts on different aspects of lighting, are already assembling material for this meeting. Meanwhile, we shall continue to keep our readers informed of interesting developments abroad as well as at home.

Notes and News

ENCLOSED with each copy of this issue to readers in the United Kingdom is a ticket for the ASEE Electrical Engineers' Exhibition to be held at Earls Court from April 9 to 13. If you already have a ticket for the exhibition or cannot make use of that enclosed you are asked to pass it on to someone who can use it—particularly to someone who is interested in lighting, with a hint that they visit the IES stand. The theme of the exhibition this year is Education and the IES has accepted the organisers' invitation to participate in the Educational Section in the gallery at Earls Court. The aim of the IES stand, which has been designed by John Reid, is to show the kind of thing the lighting engineer does for a living and the importance of the work of the Society to all who are concerned with lighting, i.e., to everyone. Few people realise just what an important part the Society has played in the development of lighting during its existence of nearly 50 years. Through its meetings and publications the Society has assisted the technical education of its members; in collaboration with the City and Guilds it has set a standard of theoretical knowledge at which students can aim and which together with standards of practical ability provide the " hall mark " of the qualified lighting engineer. The Society has also encouraged the holding of courses at technical colleges and has made correspondence courses available. Its educational work has, however, extended far beyond the membership; the IES Code alone is known to thousands who know nothing more about the Society. We should like to think that all visitors to Earls Court will visit the stand and get to know about the IES.

Association Belge de l'Eclairage Public

We reported a few months ago on the proposal to form a lighting society in Belgium though at the time it was not clear whether it would deal with the whole range of lighting subjects or be confined to street lighting. We now learn that it will deal with *public* lighting including not only street lighting but floodlighting, sports lighting, traffic signals, etc. This is a very good idea and we congratulate our Belgian colleagues on their interpretation of " public." We would also congratulate Andre Boereboom, of the Belgian Ministry of Public Works and Reconstruction, on being appointed the first President of the Association Belge de l'Eclairage Public.

It is the intention of the ABEP (we might as well be the first to use the initials) to hold a two-day annual meeting at which technical papers will be presented and to have an exhibition of equipment every three or four years. Linguists might like to note that the proceedings at annual meetings will be in both French and Flemish.

Colour and Make-up

Most members of the IES have at some time or other heard Mr. L. G. Applebee on the subject of theatrical make-up—though few no doubt thought this a strange subject for " engineers." It is not such a strange subject for the Colour Group, for make-up is, or at least we imagine it is, mainly a matter of applying colour to faces however much skill may be needed to do it properly.

In a recent talk to the Colour Group Mr. R. Blore, of Leichners, went back to the very early days of the theatre when make-up was used mainly to attract attention. He quoted a verse which dated from the sixteenth century and which gave a description in some detail of theatrical make-up. Originally the colours were applied in powder form on a basis of cream, but in 1873 came the familiar " grease paint " in the convenient form of sticks. The number of colours, at first small, has greatly increased with the passage of time, but No. 5 (ivory) and No. 9 (red) are still the most popular. Mr. Blore demonstrated on a live model how make-up could be used to alter the features, e.g., to make a nose appear longer or shorter, to create the impression of age, and so on. He discussed and demonstrated the effect on make-up of stage lighting of various colours, using the colour changing equipment available in the Strand Demonstration Theatre where the meeting was held. He did not confine himself entirely to the theatre but dealt also with the special types of make-up used for cinema and television studio work. The Chairman, Mr. R. G. Horner, wanted to know why it seemed to be assumed that make-up was always needed on the stage or for a television production. This inquiry elicited the rather surprising reply that it was, in fact, not always necessary; everything depended on the actor's own conception of the part he was to play and how far this coincided with his own physical appearance. The television camera, however, always seemed to emphasise the beard mark in men and it was generally necessary to eliminate this with a little make-up.

The south side of Rio de Janeiro at night as seen from Corcovado Hill. On the other side of the bay, the city of Niteroi.

An INTERNATIONAL REVIEW

of lighting progress in 1956

In this annual review of lighting throughout the world it is possible only to draw attention to the main developments and trends. The details given in the following pages have been compiled from information supplied by correspondents in 17 countries and give a reasonably balanced picture of lighting practice in those countries. Many interesting developments in light sources and in applications are reported, including some items from countries which have not been mentioned in previous reviews of this kind. This feature is read with great interest in all the 56 countries in which "Light and Lighting" circulates; for the benefit of some of our overseas readers the text on this occasion is also in French and German (pages 118-123).

Light Sources

This year there is little to say about light sources; it seems that most of the countries from which we have received comments are now making good use of such lamps as tungsten reflector spot, fluorescent reflector and colour-corrected mercury lamps, etc.

In the tungsten lamp field many countries which were formerly dependent upon imports are now manufacturing most, if not all, they require. In Yugoslavia the internal silica-coated lamp is now made; in Brazil 97 per cent. of the raw materials are home produced and at one factory filaments are made from Brazilian tungsten ore. Finland also is now producing nearly all the tungsten lamps used there, and it is interesting to note that because of the relatively high cost of lamps and low cost of electricity they are made to give an average life of 1,500 hours. Improvements in manufacturing techniques have resulted in increased luminous efficiency and a price reduction of 15 per cent. During the year coloured reflector lamps were introduced. Vertical filament lamps were introduced into Brazil during the year.

In the United States the pink-tinted lamp, introduced a couple of years ago to bring a bit of warmth into tungsten lighting, now has a partner with a colour towards the other end of the spectrum and intended for use where a cool, restful light is required. It was possibly to allay any fears that we might eventually be faced with a whole gamut of moods from elation to despair that the announcement of this cool lamp states that there would appear to be no need for extending the range into a broad variety of additional colours. Another maker, however, announced a range of pink, green, blue and pastel tints; so there it is, and the house wife can now turn on the hot and the cold and will no doubt use both or all at the same time.

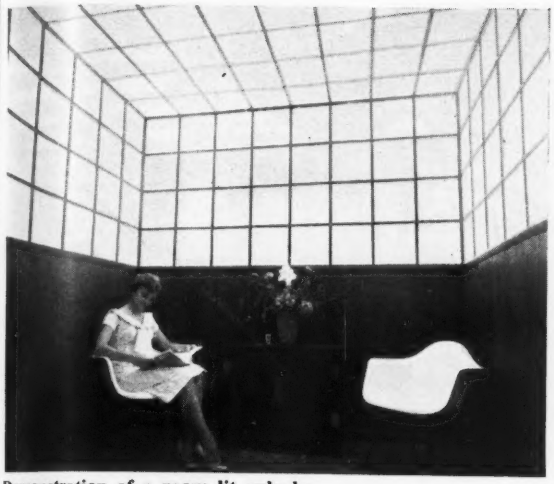
The tendency already noted in other countries towards the use of the larger-wattage tungsten lamps is also reported from New Zealand, where the demand for lamps from 40-watt downwards shows a significant drop in favour of a much greater demand for lamps in the 100-150-watt range.

The preference for colours of fluorescent lamps seems to be much the same as reported last year. Both in New Zealand and in Finland the greatest demand is for the warm-colour lamps. In the latter country there are probably a number of reasons for this choice; the cold climate in winter, the illumination levels not being high enough to support the use of cold-colour lamps, whilst in the winter artificial lighting is in use most of the day and the natural lighting is such that it can be ignored and the artificial lighting made as attractive as possible.

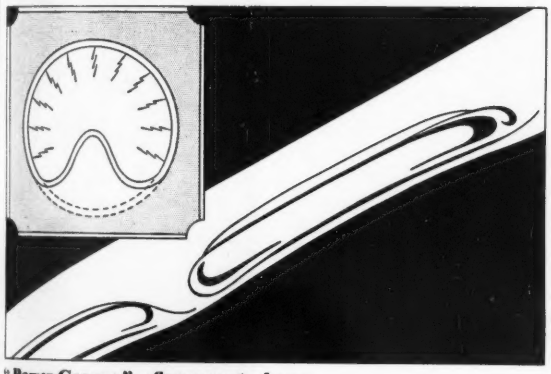
New lamp production in Finland includes 15-watt 18-in. and 30-watt 3-ft. lamps. From Italy the introduction is reported of a candle-shaped 15-watt fluorescent lamp fitted with a single screw cap at one end. It is made in four shades of white and requires special ballasts for connecting to A.C. supplies. During 1956 the manufacture of rapid-start lamps and ballasts began in Brazil.

In Italy and Yugoslavia the demand for fluorescent lamps continues at an ever increasing rate. At Zagreb new machinery has been installed to increase production and in addition to the 20- and 40-watt lamps a 65-watt is now made.

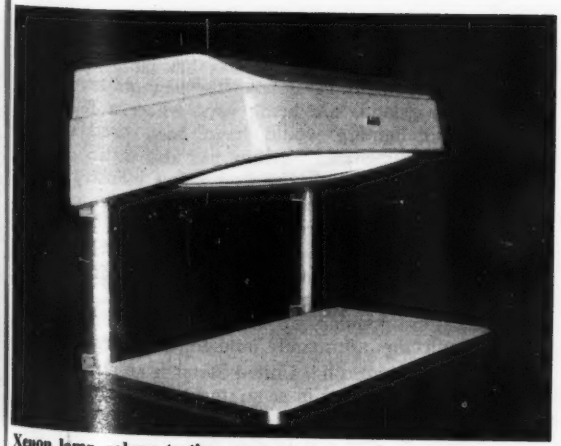
From the United States two important developments to get



Demonstration of a room lit only by electroluminescence. (Westinghouse, USA.)



"Power-Groove" fluorescent lamp. (General Electric, USA.)



Xenon lamp colour testing apparatus. (AEG, Germany.)

more light out of fluorescent lamps have been reported. The General Electric "Power Groove" lamp is claimed to give twice the light output of present lamps of equal length. This increase is obtained by forming a series of lengthwise dents or grooves along one side of the glass tube. This restriction in internal cross-section permits a much higher loading which together with the greater area of tube surface thus achieved results in the greater light output. This development is available in the 8-ft. 200-watt and 4-ft. 100-watt lamp and other sizes are forecast. The Sylvania VHO (very high output) is claimed to give two and a half times as much light as a conventional lamp. The glass tube is the same as with a normal lamp; the extra light is obtained by using a neon-mercury filling instead of argon-mercury. The VHO is also available in the 4-ft. 100-watt and 8-ft. 200-watt sizes. Both the "Power Groove" and the VHO are most interesting developments; one can see many possible applications where their increased luminous output may have some effect.

A few months ago Westinghouse demonstrated the lighting of a room solely by electro-luminescence. The walls and ceiling of the room were covered by 112 panels each one foot square which gave a soft green light and a panel brightness of 100-ft.-L. Power supply was 350-volt, 3,000 cycles A.C.; the efficiency is given as 3 lm/w.

Sylvania, who claim to be the only American firm marketing electro-luminescent lamps, state that the all-glass lamp has now been replaced by one made of steel, coated with a ceramic and phosphor mixture, a tin salt solution and a transparent conducting surface of a tin compound.

Mercury lamps, both the normal type and the colour-corrected, are finding plenty of application; in the United States the manufacturers of both types would seem to be doing good business. In Belgium, where the colour-corrected lamp was very early applied for the purpose, 80-, 125-, 250- and 400-watt lamps are being widely used for street lighting. Much interest has been shown in New Zealand and elsewhere in the colour-corrected variety, but price is still a deterrent to their use. A 50-watt colour-corrected lamp, such as was reported last year as having been introduced by Osram in Germany, is now available in Italy, where greater use is also being made of ordinary mercury lamps for flood-lighting and outdoor lighting.

There is little to report on sodium lamps though the new British integral lamp has been received with interest and it is understood that the Wellington City Council, whose extensive sodium street lighting programme has been referred to in previous reviews, has decided to adopt this lamp.

On new light sources there is the Sylvania "RF" lamp which is powered by radio-frequency energy and has a brightness greater than any incandescent lamp, giving it great possibilities for such things as projection, film printing and medical research.

And talking about projection, our New Zealand correspondent tells us that with the arrival in his country of new British and Continental colour slide projector lamps the range of lamps is becoming embarrassing. Colour photography is very popular in New Zealand and there would seem to be a boom in photographic and projection lamps—but life would be simpler if there could be some standardisation and reduction of types. The immediate prospect is not very bright as the development of projectors is undergoing a minor revolution tending in shape to follow the portable typewriter to a lower and wider outline. This calls for lamps to burn horizontally rather than vertically. New designs have been announced by GE and by Sylvania and it seems certain that more and not fewer types will soon be available.

Luminaires

From the illustrations which have been received from many countries it would seem that whereas a few years ago designers and lighting engineers were mainly concerned with the performance and efficiency of fluorescent lamp luminaires, interest is now centred upon the decorative effects which can be obtained with tungsten lamp luminaires. (One wonders whether designers have given up as hopeless the task of clothing the fluorescent lamp decoratively.)

The only example of a fluorescent lamp luminaire for industrial use comes from Germany, being a new type for use in corrosive atmospheres. The housing and trough are of "Plexiglass"; no screws or hinges which might corrode are used.

Plastics are in fact being used very much more in all types of luminaires both for louvres and for complete enclosures. The Australian luminaire illustrated is typical of contemporary design in that country. The clip-on louvre assembly consists of moulded polystyrene cross-blades interlocked with three longitudinal baffles. The cross-blades are of what is described as "quartic" in shape, a shape which has met with general approval in the country.

Some illustrations of luminaires from Finland, the Scandinavian countries and Italy are shown. These countries did much to set the pattern of design in other countries which, though they have not necessarily followed the same trends or used the same materials, have at least been stimulated to think for themselves. As a result there is a demand for modern luminaires in most parts of the world. Illustrated are some of a range which was designed and is being manufactured in South Africa. In New Zealand, too, the demand for modern designs of tungsten lamp luminaires is growing and in many cases (e.g., the new air terminal at Whenuapai, Auckland) are being used where a few years ago fluorescent lighting would have been used without question. The "lumenated" ceiling has also made its mark in New Zealand. Brazil has a flourishing industry in the manufacture of luminaires and few are now imported.

Unfortunately little information is available on luminaires intended for recessing into ceilings, a field in which there has been much development in the United Kingdom and in the United States. In Belgium the use of recessed luminaires is becoming more popular and in Finland specular anodised aluminium reflectors are mainly used for this purpose.

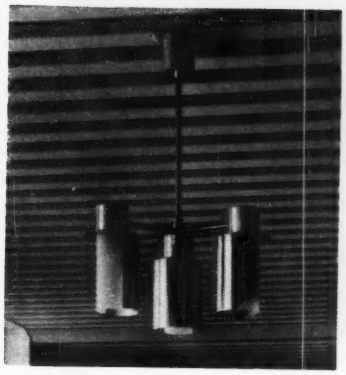
A development from the United States is an acrylic panel which may be used either in separate luminaires or in mass in luminous ceilings. The panel incorporates very small lenses designed to give low brightness.

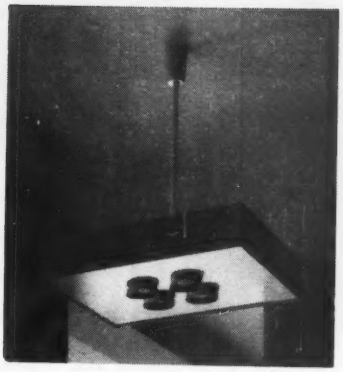
A number of the illustrations in other sections of this review show additional modern luminaires.

Above, luminaires designed by Birger Dahl at an exhibition in Oslo. (Sonnico, Oslo.)

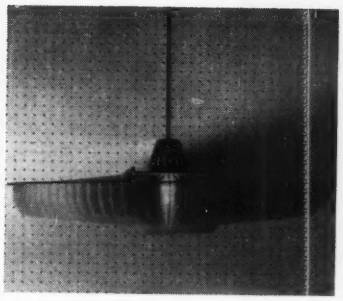
Right, Orrefors crystal glass luminaires. (Lyfa, Copenhagen.)

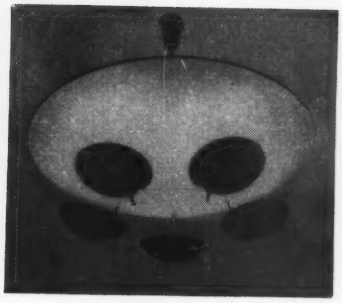
Norwegian luminaires designed by Bjorshol. (Hovik Verk, Oslo.)



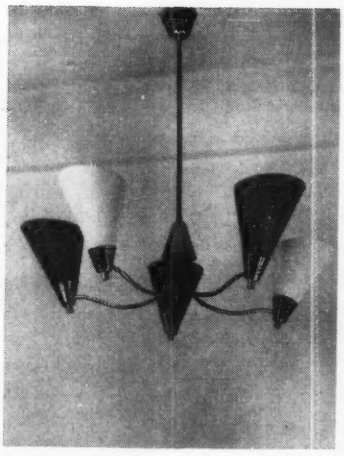


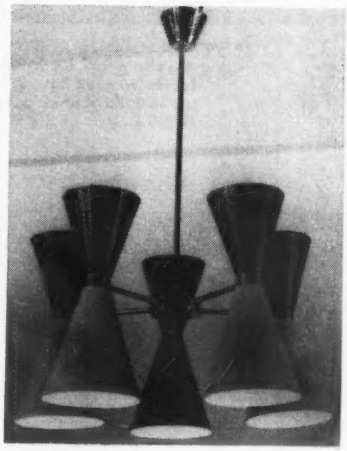
Left, chandelier in opal glass satin brass. (Louis Poulsen, Copenhagen.) Right, pendant luminaire in plywood and aluminium. Direct lighting by reflector spot tungsten lamps, indirect by fluorescent lamps. Designed by Johansson and Nummi. (Orno, Finland.)



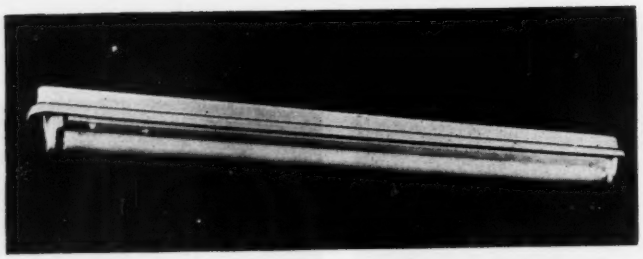


Two Italian luminaires. The one on the left is entirely of "Perspex." (Stilnovo, Milan.)

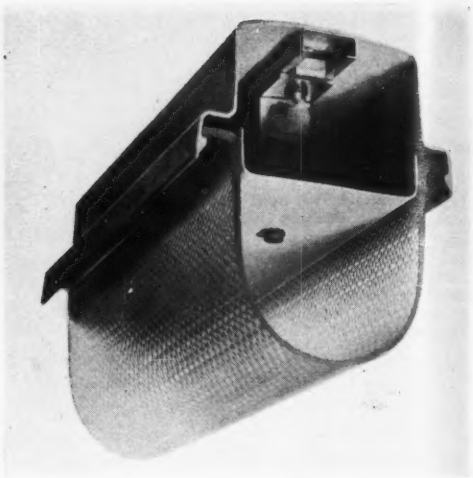




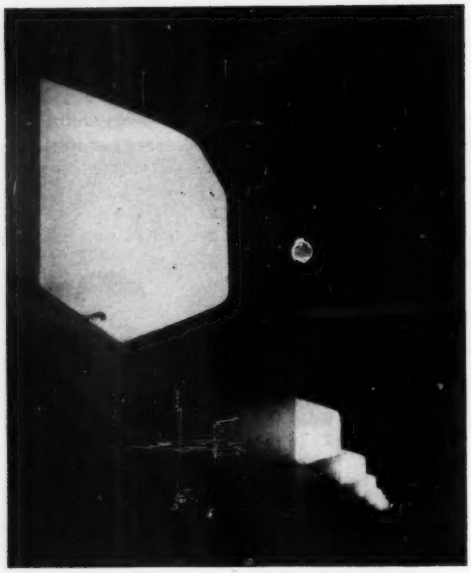
Two South African pendant luminaires. (Falks, Johannesburg.)

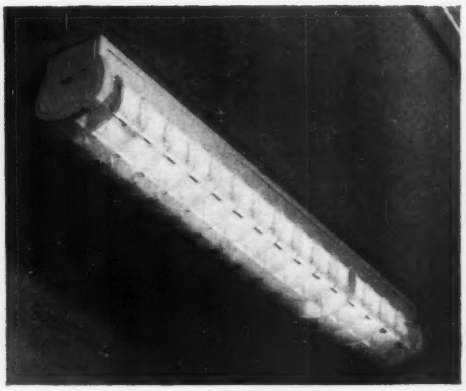


Fluorescent lamp luminaire for use in corrosive atmospheres. Right, section through luminaire. (Siemens-Schuckert, Munich.)



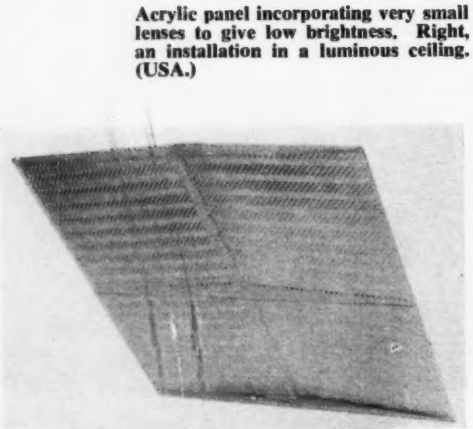
"Perspex" wall-mounted luminaire designed by Johansson and Nummi. (Orno, Finland.)

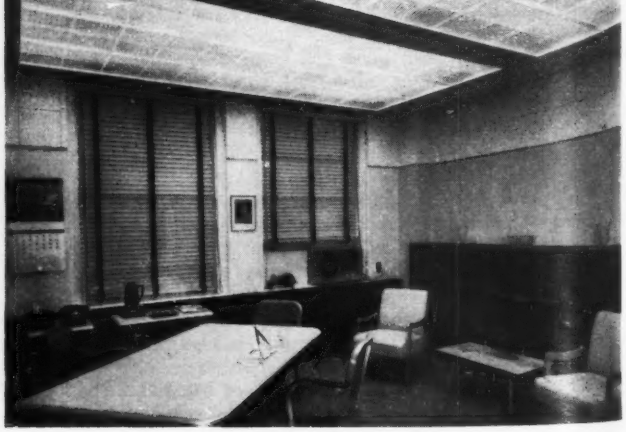




Twin-lamp fluorescent luminaire. (Claude Neon, Sydney.)

Acrylic panel incorporating very small lenses to give low brightness. Right, an installation in a luminous ceiling. (USA.)





Street Lighting

A mass of photographs of street lighting installations has been received from most of the countries contributing to this review. As it is impossible to include all of them the endeavour has been to show the most interesting. It is clear, however, that all over the world street lighting is considered a most important subject by manufacturers, local authorities and by the public. Those countries which have the greater facilities both in equipment and money still devote a good deal of thought to improving on their best, and those countries not so fortunately placed are making experiments from which all may well learn.

In recent years municipal engineers in South Africa have become more and more conscious of the need to improve street lighting. The lead given by European cities has been taken up. South Africa has the problem of comparatively small municipalities which are responsible for long stretches of roads, the cost of lighting which can place a very heavy burden on the municipal rates. Whilst it is generally recognised that fluorescent lamps should operate in enclosed lanterns, the cost of such lanterns is often more than a municipality can afford. It has therefore been the aim of South African manufacturers to design cheaper lanterns and this has led to the use of open lanterns varying in size from 2 x 20 watt to 4 x 80 watt. Illustrated is such a lantern consisting of a heavy gauge hood and a reflector assembly which carries all control gear and lamps. After the hood is fixed to the bracket arm, the reflector assembly is hinged to the hood, and the wiring connections are made, the reflector is swung into position and engaged into the hood. The whole fitting is finished in high-quality baked enamel.

In New Zealand more attention is now being paid to side street lighting and interest has been shown in small enclosed type lanterns housing 100/150-watt tungsten lamps. Previously, side street lighting has consisted mainly of open type vitreous enamel reflectors housing 100-watt lamps open to the elements; the resultant lamp life has not been too good and maintenance and replacements have been heavy items in view of the limited benefits gained from this not very efficient form of street lighting. Lamp life has been one of the deciding factors in some areas, particularly in the South Island, for the retention of series street lighting installations. In Christchurch series type street lighting lanterns with inner refractors and outer diffractor bowls have recently been installed. There has been a small increase in the amount of fluorescent street lighting in the past year in both the North and South Islands. Auckland undoubtedly has the most fluorescent street lighting, though some of the smaller communities are installing this form of street lighting particularly where they are astride a main highway. The only other main centres employing this source are Hutt City and Christchurch. Wellington still remains aloof (on account of its winds) as also does Dunedin, though not for the same reason. For the benefit of readers of previous reviews it should be mentioned that the mercury/sodium controversy still flourishes between Auckland and Wellington.

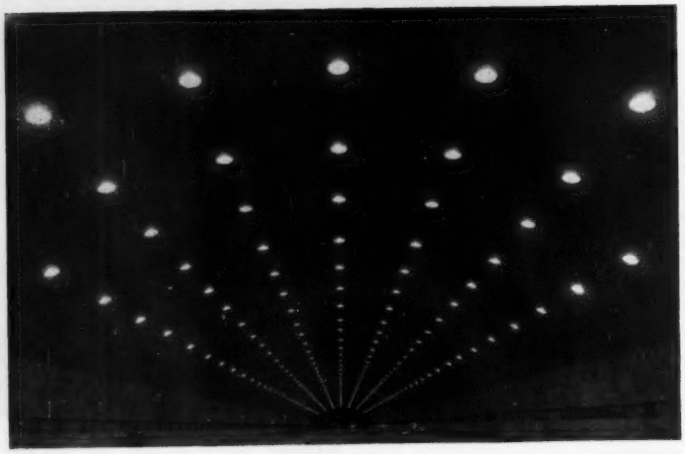
From Australia there is little evidence of an improvement in the general overall standard of street lighting, but two small points of interest are the increasing use of MBF lamps which in some places are replacing MA lamps, and the recent installation, believed to be the first in the country, of aeroscreen lanterns (125- or 250-watt mercury lamps) on roads in and around Kingsford Smith Airport in Sydney.

A few months ago an experimental system of lighting roads by means of a continuous row of fluorescent luminaries mounted parallel to and 25 ft. above the kerb was demonstrated in the United States. It is stated (not unreasonably) that the system gives almost perfect uniformity of light on the road and that fluctuations in brightness are virtually eliminated. It is stressed that the system is still in the experimental stage.

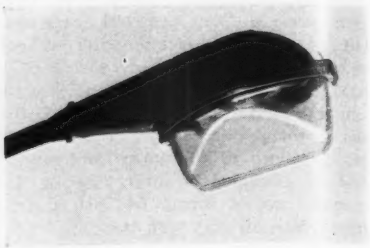
Coming now to Europe, it would seem that the problem is one of economics rather than technical limitations. In Belgium, however, the consumption of energy for street lighting has been steadily increasing at a greater rate than that for other uses. In general, open-type lanterns with polished aluminium reflectors, 40-watt fluorescent, 125- and

Champs-Elysées, Paris. (Mazda, and Claude, Paz et Visseaux.)

Sao Paulo by night.



The new Pasmado tunnel at Rio lit by recessed tungsten lamps.



Luminaire for colour-corrected mercury lamps. (Siemens-Schuckert, Munich.)

Sodium lighting at Ymuiden at the entrance to Amsterdam Harbour. (Philips, Holland.)

Fluorescent lamp luminaire. (S A Philips, Johannesburg.)

The Wilhelmina Bridge at 's-Hertogenbosch lit by fluorescent lamps in the parapet. (Schreder, Holland.)

Luminaire housing 16 15-watt fluorescent lamps at Bolzano, Italy.

250-watt colour-corrected mercury and 140-watt sodium lamps are used in Belgium.

In Holland also, aluminium fittings with polished reflectors are finding favour with street lighting authorities. Several provinces have more or less standardised on open cut-off lanterns with either symmetrical or asymmetrical reflectors. At Utrecht totally enclosed cut-off-type fluorescent lanterns are being used throughout the city. Other big cities such as Amsterdam and the Hague would seem to be reluctant to install fluorescent lighting though installations of the cheaper wide angle non-cut-off type are springing up in nearly every village.

Almost every new installation in Yugoslavia is fluorescent and a new post-top lantern has proved very popular.

Madrid, a poorly lit city only five years ago, has now come to be an extremely well lit one. The enormous street lighting programme laid down five years ago is still far from complete as there are still large areas where the old lighting has yet to be replaced and brought up to date. Nevertheless, some idea will be given of the considerable work carried out in this period from the fact that 23,155 new lighting units have been installed in the suburbs, in the central zone of the capital, and in the main streets and avenues. Different types of lanterns and lamps have been used: mixed light, fluorescent lamps (usually 40-watt), and colour-corrected mercury lamps of 125, 250 and 400-watt, whilst in the large avenues 1,000-watt colour-corrected lamps are used giving average illumination on the road of as much as 3 lm/ft². So far a total of 533 km. of roads have been re-lit. In the residential districts of the capital the existing lanterns have been modernised producing more efficient and effective installations.

In France the tremendous financial outlay first on reconstruction and now on housing has left little money for improvements in street lighting. Like many other countries, France also suffers from a plethora of public lighting authorities. It is not surprising therefore that the standard of lighting in many towns leaves something to be desired and that many major roads by night present an incoherent succession of sections which may be well-, badly- or unlighted. Nevertheless, there have been some outstanding installations recently. The relighting of the Champs-Elysées was reported in *Light and Lighting*, September, 1956, page 234. Several other main roads in Paris have also been relit. It is well known that Parisians are very colour-conscious; most, if not all, of the new installations within the city are therefore of tungsten, colour-corrected mercury plus tungsten, or fluorescent lamps. There have also been a number of interesting new installations in other parts of France; these will be featured in a future issue of *Light and Lighting*. The lighting of the Jenner Tunnels at Le Havre was reported in the November, 1956, issue.

Included in this section are photographs of the lighting of bridges in Brazil, Belgium and Holland. Mention should also be made of the lighting of the Richmond-San Rafael Bridge across San Francisco Bay. This is the world's longest high level bridge, the over-water section of which is four miles long; the approaches add another one and a half miles. The bridge is double-decked, the upper deck for westbound traffic and the lower for eastbound traffic. The bridge and approaches are lit by 422 four-lamp fluorescent lanterns, 332 on the two decks, 32 in the toll area and 58 on the approaches. On the upper deck the lanterns are mounted on columns and brackets at a height varying between 27 and 29 feet and at a spacing of 138 to 150 feet; on the lower deck they are mounted on brackets fixed to the upper deck girders at heights varying between 22 and 24 feet at a spacing of 110-130 feet.

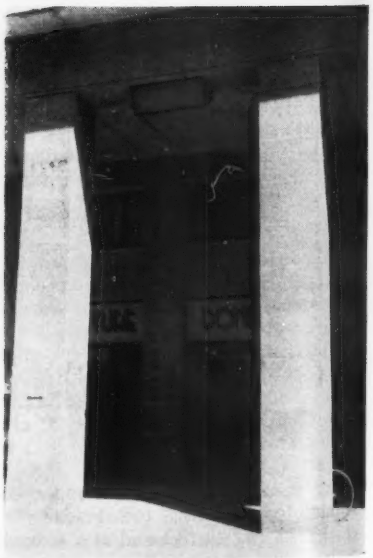
Fluorescent lighting in an industrial district in Belgium; visibility is improved by the nature of the road surface. (ACEC, Charleroi.)

Installation of single lamp plastic fluorescent luminaires centrally suspended. (Siemens-Schuckert, Munich.)

Frontier station at Krusaa on the Danish-German border lit by fluorescent mushroom type luminaires. (Siemens-Schuckert, Munich.)

Experimental installation on existing columns of colour-corrected mercury lamps in Argentina.

Avenue de la Couronne, Brussels, lit by 250-watt colour-corrected mercury lamps. (Schreder, Belgium.)

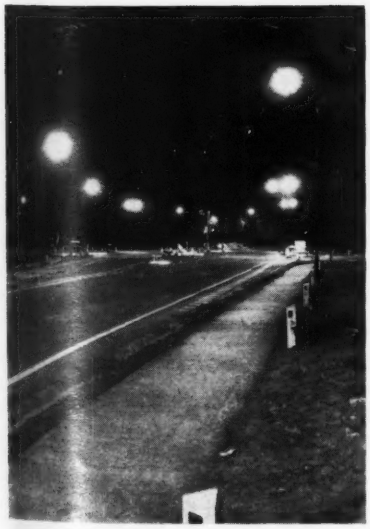


Showing how the luminaires in the installation shown on the left are mounted.

The Corso Liberta at Bolzano lit by fluorescent luminaires mounted between the columns of the arcade on each side of the road.

One of the old streets in Madrid where gas lanterns have been converted to house colour-corrected mercury lamps.

Fluorescent lamp luminaires mounted on wall brackets in the Calle de Magdalene in Madrid.



Sodium lighting at a dangerous road junction. (Philips, Brussels.)

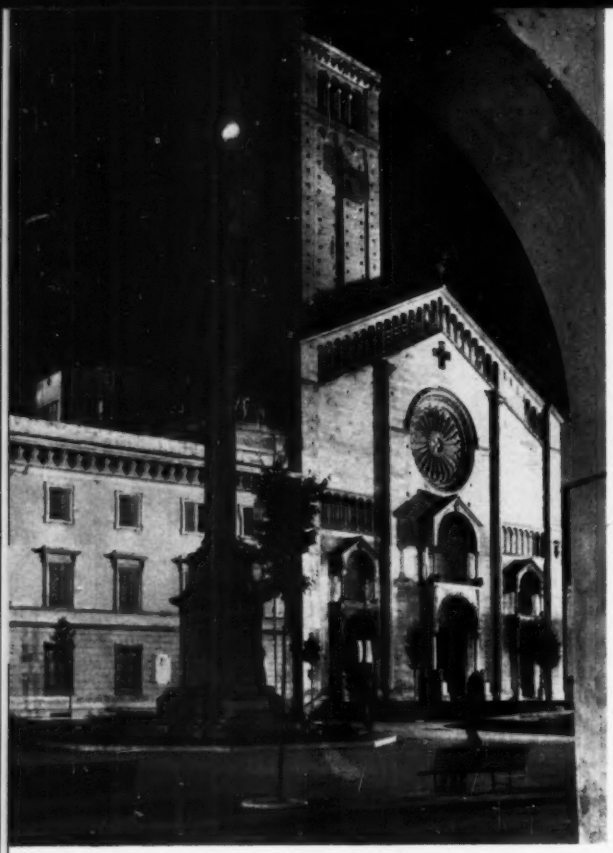
The square in front of the railway station at Eindhoven lit by 400-watt colour-corrected mercury lamps mounted at 40 ft. (Philips, Holland.)

Floodlighting

Though the illustrations in this section are mainly of the larger and more impressive type of installations (which usually photograph and therefore reproduce better) reports have also been received of quite a number of smaller examples. In Madrid, for example, though many of the larger public buildings are floodlit by the public lighting department, the latter has also successfully floodlit on a smaller scale several places of interest in the older parts of the city.

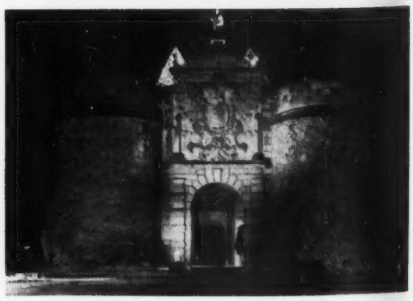
Of the many excellent examples reported from Italy that of the façade of the Duomo of Piacenza is probably typical of the care with which such installations are designed. By day this particular façade is seen to the best effect in the evening when the sun is setting. In designing the floodlighting the same modelling effect was required. It was achieved by mounting all the floodlights on the buildings on one side of the façade. Two 1,500-watt dispersive floods are directed on to the façade, one on to the tower and six 500-watt projectors fitted with reflectors which are partly specular and partly lightly etched are directed at various points to give the modelling required.

Floodlighting, however, is by no means confined to old buildings; several countries have included examples of commercial and industrial buildings or projects. In some cases the lighting serves more than one purpose as in the case of the Chief Joseph Dam in Washington, where in addition to providing a spectacle for tourists the lighting is essential for work and security. In Brazil also, commercial undertakings realise the publicity value of floodlighting, and in Germany factories and office blocks are subjects as welcome as cathedrals. Our Belgian correspondent is very fond of bridges, and an illustration shows the lighting arranged at the inauguration of a new bridge at Huy over the Meuse. There are now many floodlit places in the Meuse valley for the attraction of tourists.



The Duomo di Piacenza, Italy. (Buini and Grandi, Bologna.)

The cathedral at Toledo.



The Puerta de Bisagra, Toledo.

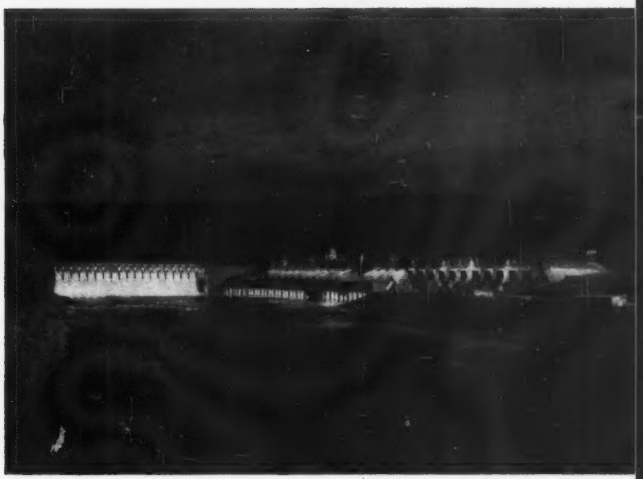
The offices of the Allianz Versicherungs A.G., Berlin. (Zeiss Ikon, Berlin.)

Huy on the River Meuse. (Philips, Brussels.)

Statue of Christ on Corcovado Hill above Rio de Janeiro.

The Theatinerkirche, Munich. (Siemens-Schuckert, Munich.)

The Chief Joseph Dam, Washington.



(Continued on page 124)

Internationale Ubersicht

Diese Jahres-Ubersicht über die Beleuchtung in der ganzen Welt kann die Aufmerksamkeit nur auf die hauptsächlichen Entwicklungen und Richtungen lenken. Die Einzelheiten wurden von Korrespondenten in 17 verschiedenen Ländern zusammengetragen und geben ein einigermassen ausgeglichenes Bild der Beleuchtungspraxis in diesen Ländern. Uber zahlreiche interessante Entwicklungen von Lichtquellen und Anwendungen wird berichtet und ebenso von Ländern, die in den früheren Abhandlungen gleicher Art noch nicht erwähnt waren. Die bisherigen Ausgaben wurden mit grossem Interesse in all den 56 Ländern gelesen, wo *Light and Lighting* gehalten wird. Sicherlich wird es von einem Teil der Leser ausserhalb unseres Landes begrüsst, dass wir den Text auch in Deutsch und Französisch ausgedruckt haben.

Lichtquellen

Jetzt, wie es scheint, machen die meisten Berichts-Länder starken Gebrauch von Spiegel-Glühlampen, Leuchtstofflampen mit Reflektorschicht, Quecksilberdampflampen mit Leuchtstoff usw.

Viele Länder, die früher auf Glühlampen-Importe angewiesen waren, decken heute einen Grossteil, wenn nicht alles, durch eigene Herstellung. Jugoslawien fabriziert innen-silizierte Glühlampen. Brasilien stellt 97 prozent des Rohmaterials selber her und in einer Fabrik werden die Glühwendel aus brasilianischem Wolfram gefertigt. Finnland fertigt nahezu sämtliche Glühlampen selber, wobei sie wegen der relativ hohen Lampen- und niedrigen Stromkosten zu einer Lebensdauer von 1,500 Stunden übergehen. Fertigungsverbesserungen steigerten die Lichtausbeute bei einer Preisherabsetzung von 15 prozent. In Brasilien werden die Glühlampen mit senkrechter Wendel eingeführt.

In den USA wurden vor einigen Jahren rosafarbene Glühlampen hergestellt, die jetzt die Ergänzung durch eine Farbe nach der anderen Seite des Spektrums erhielten. Sie sollen ein kühles, beruhigendes Licht schaffen, wo dies verlangt wird. Trösten wir uns damit, dass wir in den nächsten Jahren nicht mit einer ganzen Tonleiter verschiedenfarbiger Lampen rechnen müssen, die von der aufregenden bis zur niederdrückenden Stimmungsbetonung reichen. Freilich hat ein anderer Hersteller bereits rosafarbene, grüne, blaue und pastellfarbene Lampen angekündigt.

Die Tendenz vieler Länder zur Verwendung von Glühlampen grösserer Wattaufnahme wird auch aus Neu-Seeland berichtet. Der Verbrauch der Glühlampen von 40 W und darunter verschiebt sich zugunsten der 100- und 150 W-Lampen.

Die Bevorzugung bestimmter Lichtfarben bei den Leuchtstofflampen scheint weiterzubestehen. In Neu-Seeland und Finnland werden am meisten warme Lichtfarben verlangt. In Finnland mit den kalten und langen Winternächten erscheint das nur zu verständlich. Hier muss das Licht praktisch den ganzen Tag über brennen. Die Beleuchtung soll deshalb angenehm und anziehend wirken.

Finnland stellt jetzt auch Leuchtstofflampen von 15 und 30 W selber her, Italien eine kerzenförmige 15 W Leuchtstofflampe mit einseitigem Schraubsockel. Die letztere wird in 4 verschiedenen weissen Farbtönen hergestellt und erfordert Spezial-Vorschaltungen zum Anschluss an Wechselspannungen. Brasilien begann die Fertigung von Schnellstartlampen und dazu gehörigen Vorschaltungen.

In Italien und Jugoslawien steigt der Verbrauch von Leuchtstofflampen immer stärker an. In Zagreb wurden die Produktions-Anlagen erweitert, wobei neben 40 W- jetzt auch 65 W-Lampen hergestellt werden.

Aus den USA wird über zwei wichtige Entwicklungen, "mehr Licht" aus den Leuchtstofflampen herauszuholen, berichtet. Das ist erstens die "Power-Groove"-Lampe der GEC mit angeblich zweifach so hoher Lichtausbeute als eine normale Lampe gleicher Länge. Hierbei besitzen die Glasröhren einseitig Längsrillen (groove = Kehle oder Rinnen). Die Querschnitts-Verringerung erlaubt eine höhere Belastung, die zusammen mit der vergrösserten Oberfläche die Lichtausbeute erhöht. Verfügbar sind z.Zt. 100 und 200 W-Lampen (1,2 und 2,4 m lang), weitere in Vorbereitung. Die Sylvania VHO (Very High Output = sehr hohe Ausbeute) soll das 2,5-fache der bisherigen Lampen geben. Dies wird bei unveränderter äusserer Form durch eine Neon-Füllung (statt Argon) erreicht. Die "Power Groove" und die VHO stellen sehr interessante Entwicklungen dar. Es werden sich zahlreiche Anwendungsmöglichkeiten dort ergeben, wo die höhere Ausbeute von Bedeutung ist.

Vor einigen Monaten zeigte Westinghouse die Beleuchtung eines Raumes nur durch Elektro-Lumineszenz. Wände und Decke waren mit 112 Platten von je 929 cm^2 bedeckt, die ein weiches grünes Licht bei einer Leuchtdichte von 0,0343 sb ergaben. Daten: 350 V, 3000 Hz Wechselspannung, 3 lm/W.

Sylvania erhebt den Anspruch, die einzige amerikanische Firma zu sein, die elektrolumineszente Lampen liefert. Sie wird das Glas durch Stahl ersetzen, der mit einer Mischung aus Keramik und Phosphor überzogen wird, einer Zinnsalzlösung und einer durchscheinenden leitenden Oberfläche aus einer Zinnverbindung.

Quecksilberdampflampen mit und ohne Leuchtstoff finden in den USA in weitem Umfange Verwendung. In Belgien, wo die Lampen mit Leuchtstoff schon frühzeitig für Strassenbeleuchtung eingesetzt wurden, gilt dies besonders für 125-, 250- und 400 W. Der Preis dieser Lampen verhinderte in Neu-Seeland und manchen anderen Ländern ihre Einführung. Eine 50-W-Lampe mit Leuchtstoff, wie sie Osram in Deutschland 1955 herstellte, steht jetzt auch in Italien zur Verfügung, wo auch die normalen Quecksilberdampflampen für Anleuchtungen und Aussenbeleuchtung viel benutzt werden.

Uber Natriumlampen ist wenig zu berichten, obwohl die englische "Integrallampe" mit Interesse aufgenommen wurde und der Wellington City Council sich für ihre verwendung entschlossen hat.

In Neu-Seeland gehören Farbfotografie und -Projektion zu einem weitverbreiteten hobby. Entsprechend ist der Bedarf an Projektionslampen, die sowohl aus England und vom Kontinent kommen und leider starke Abweichungen voneinander zeigen. Eine Standardisierung und Beschränkung auf weniger Typen wäre angebracht. Im Augenblick sind freilich die Aussichten dafür gering, da die Formen der Projektoren (ähnlich wie eine Reiseschreib-maschine aussehend) eine Entwicklung durchmachen, die mehr nach Lampen mit horizontaler als vertikaler Brennlage verlangen. Hier liegen Ankündigungen von GEC und Sylvania vor, sodass die schliessliche Typenzahl sich eher erhöhen als verringern wird.

Leuchten

Wir haben aus einer ganzen Reihe von Ländern Abbildungen erhalten. Während in den vergangenen Jahren hauptsächlich an Leuchten für Leuchtstofflampen hinsichtlich ihrer Betriebseigenschaften und Wirtschaftlichkeit gearbeitet wurde, konzentriert sich jetzt das Interesse auf dekorative Wirkungen, die mit Glühlampen-Leuchten erreicht werden können. (Da bleibt die Frage offen, ob die Leuchten-Entwerfer es als hoffnungslos aufgegeben haben, die Leuchtstofflampen dekorativ zu umkleiden.)

Das einzige Beispiel einer Fabrikleuchte für Leuchtstofflampen kommt aus Deutschland, mit einer Type für aggressive Umgebungsverhältnisse. Das Gehäuse besteht aus Kunststoff, mit einer Wanne aus "Plexiglas," ohne korrodierende äussere Schrauben oder Scharniere.

Kunststoffe werden ausserdem bei vielen Leuchten für Raster und Umkleidungen verwendet. Die abgebildete Leuchte aus Australien ist typisch für den dortigen Geschmack. Der Raster besteht aus gepressten Polystyren-Querstreifen.

Einige Abbildungen zeigen Leuchten aus Finnland, den skandinavischen Ländern and Italien. Diese Länder waren bestimmend für die Entwicklung in anderen Ländern, auch wenn sich dabei Abwandlungen in Form und Material zeigten. Als Ergebnis ist der Wunsch nach modernen Leuchtenformen in den meisten Ländern der Welt festzustellen.

Einige Leuchten, die in Südafrika entwickelt wurden, sind abgebildet. Auch

in Neu-Seeland wächst die Nachfrage nach modernen Glühlampen-Leuchten und sie werden manchmal dort eingesetzt (z.B. beim neuen Flughafen in Whenuapai, Auckland), wo man vor Jahren zweifelsohne Leuchtstofflampen genommen hätte. Die " leuchtende Decke " hat in Neu-Seeland ebenfalls Eingang gefunden. In Brasilien wächst die eigene Leuchtenherstellung und der Import ist gering.

Bedauerlicherweise wurden wenig Angaben über Decken - Einbauleuchten gemacht, die in den USA und England viel Verbreitung fanden. In Belgien nimmt die Anwendung derartiger Einbauten zu, in Finnland werden hierfür hauptsächlich eloxierte Spiegel genommen.

Aus den USA ist von Acrylic-Platten zu berichten, die mit einer sehr kleinen Linsen-Optik versehen sind, welche niedrige Leuchtdichten ergeben. Sie werden in Einzelleuchten oder in grosser Zahl in leuchtenden Decken verwendet. Weitere Bilder zeigen zusätzlich moderne Leuchten.

Anleuchtung

Wenn auch die Bilder auf diesem Gebiet besonders eindrucksvolle grössere Anlagen zeigen (die gewöhnlich besser zu fotografieren und zu reproduzieren sind), erhielten wir ebenso Berichte über kleinere Anlagen. Madrid hat beispielsweise neben den grösseren öffentlichen Gebäuden mit gutem Erfolg auch eine Reihe interessanter Bauten in der Altstadt angeleuchtet.

Von den vielen beachtenswerten Anlagen in Italien mag diejenige des Duomo von Piacenza vielleicht als typisch für die dabei angewendete Sorgfalt gelten. Die beste Tageswirkung zeigt sich gegen Sonnen-Untergang. Die Anleuchtung ist auf den gleichen Effekt abgestellt, was durch Aufstellung der Fluter auf der einen gegenüberliegenden Häuserseite erreicht wurde. Sie sind mit 2 x 1500 W und Streuwirkung auf die Fassade gerichtet, eine auf den Turm. Dazu strahlen 6 x 500 W Reflektoren (teilweise verspiegelt bzw. mattiert) nach verschiedenen Punkten, um dort die gewünschte Plastik hervorzurufen.

Die Anleuchtung bleibt freilich nicht auf historische Bauten beschränkt. Einige Länder haben Anwendungsbeispiele für Büro- und Fabrikgebäude beigefügt, beispielsweise Brasilien und Deutschland.

Manchmal erfüllt sie verschiedene Zwecke, so bei dem Chief Joseph Dam in Washington. Hier gibt sie das Schaustück für die Touristen ab, gleichzeitig ist sie für die Arbeiten und die Sicherheit notwendig. Unser belgischer Korrespondent ist von Brücken sehr eingenommen und eine Abbildung zeigt die Beleuchtung der neuen Brücke in Huy (Maas) anlässlich der Einweihung. Anleuchtungen im Tal der Maas locken den Touristenverkehr an.

Sportbeleuchtung

In diesem Jahr lag das Hauptaugenmerk bei der Beleuchtung von Fussballplätzen. Es war etwas überraschend, dass in Deutschland bisher keine stationäre Anlage dieser Art bestand. Zur Genugtuung der Fussballanhänger gibt es jetzt einige erstrangige Installationen. Bei den Offenbacher Kickers sind 96 Fluter (1000 W) auf 4 Masten in 22 m Höhe angeordnet. $E_{mittel} = 115$ Lux. Eine Versuchs-Installation wurde bei der Eintracht Frankfurt/M. errichtet, mit 60 Strahler (jeder enthält 5 x 65 W Leuchtstofflampen), Masthöhe 12 m. Das neue Stadion in Leipzig (für 100.000 Zuschauer) wurde ausgestattet mit 4 Gittermaste von 17 m, Höhe über Spielfläche 40 m, 60 Scheinwerfer mit 5 kW-Lampen, $E_{mittel} = 80$ lx.

Der Claudelands Ausstellungsplatz der Waikato Agricultural and Pastoral Assoc. in Hamilton wird sowohl für Landwirtschafts-Ausstellungen wie Sportveranstaltungen mit verwendet. Die Flutlicht-Anlage sollte allen Möglichkeiten entsprechen.

Die Beleuchtungsmaste sind fahrbar und können so aufgestellt werden, wie dies jeweils erforderlich ist. Jeder der 4 Türme hat 10 1500 W-Fluter, Lichtpunkthöhe 15 m. Die Maste sind nach dem Gegengewichts-Prinzip für Einmann-Bedienung konstruiert. Eine besondere Skala erleichtert die erforderliche Einstellung der einzelnen Fluter.

Der Maracana Platz in Rio de Janeiro mit einem Raum für über 200.000 Zuschauer mag der grösste in der Welt sein. Leider sind nicht mehr technische Einzelheiten zu erhalten gewesen, als sie das Bild erkennen lässt. Danach dürften entlang jeder Seite etwa 104 Scheinwerfer aufgestellt sein.

Bei der Innenraum-Sportbeleuchtung verdient diejenige des Pallazo dello Sport in Bologna Beachtung. Die elliptische Kuppel aus Stahlrohren aufgebaut hat einen maximalen Durchmesser von 76 m. Die grosse Haupthalle ist vom akustischen Aufbau her interessant. Grundfläche des Gebäudes 7000 m². Es ist vorgesehen für Basket-Ball, Turn- und Boxveranstaltungen. Für die Beleuchtung der Spielfläche im Zentrum sind 48 Reflektoren, im Kreis an der Decke angeordnet, und zusätzlich 4 Lichtfluter. E_{mittel} etwa 550 lx. Die Bestückung besteht aus 1000 W-Glühlampen, 220 V, die mit ungefähr 240 V betrieben werden. Für den Boxring stehen weitere 20, das Licht stark konzentrierende Scheinwerfer mit 1500 W zur Verfügung, die auf der Ringfläche etwa 2500 lx ergeben. Die Tribüne ist durch 48 " Perspex "-Laternen beleuchtet, jede enthält 6 Leuchtstofflampen von je 40 W. Mit einem Thyratron-Regler kann ihre Helligkeit verändert werden. Zur Unterstützung der aesthetischen Wirkung sind die Decken der umlaufenden Gänge und des Herzstückes der Decke indirekt beleuchtet.

Verkaufsraum-Beleuchtung

Die Schwierigkeit, eine Übersicht über die Verkaufsraumbeleuchtung zu bringen, liegt darin, dass die Architekten versuchen, jedem Entwurf eine neue Note zu geben. Die allgemeine Praxis scheint auf einer intelligenten Kombination von Glüh- und Leuchtstofflampen zu basieren. Die Beispiele zeigen verständlicherweise Geschäfte, deren Objekte von der Teetasse bis zum Auto führen, dazu kommen Informationsbüros und ein Ausstellungsstand.

Industrie-Beleuchtung

Mit drei Ausnahmen sind alle gezeigten Anlagen mit Leuchtstofflampen ausgerüstet. Die Ausnahmen sind das Kraftwerk Birsfelden, Deutschland, wo 500 W-Reflektor-Glühlampen Verwendung finden, die Santo-Andre-Fabrik der GEC. in Brasilien mit Mischlicht-Leuchten, sowie ein anderer GEC.-Betrieb in Erie, USA, der mit neuen Glühlampen mit axialen Glühdrähten beleuchtet wird.

Das General Motors Technical Center in Detroit ist wahrscheinlich die hervorstehendste Beleuchtungs - Installation dieses Jahres (siehe *Light and Lighting*, August, 1956, S. 41). Gleichfalls in Detroit ist das Styling Studio der Chrysler Corp. hervorzuheben (siehe *Light and Lighting*, February, 1957, S. 41). Das 21 × 34 m grosse Studio hat eine elliptische Decke, die an der einen Seite des Raumes fast bis zum Boden reicht. Eine " Wakon "-Decke, in der 1209 40 W-Leuchtstofflampe eingebaut sind gibt mittlere Beleuchtungsstärken von 800 oder 1600 lx. Anscheinend brauchen die Entwerfer von Automobilien eine Beleuchtung, die den Tagesverhältnissen nahe kommt und bei dieser Installation wird dazu die Unabhängigkeit vom Wetter erreicht. In den Modellier-Räumen (15 × 150 m) werden mit " Wakon "-Decken 750 lx erhalten.

Weshalb haben sich diese Automobilfirmen zu derartig aufwendigen Installationen entschieden? Einige frühere Modell-Entwürfe waren unter künstlichem Licht entstanden und nach dem Aussehen gute Verkaufserfolge angenommen worden. Im vollen Tageslicht sprachen sie jedoch später die Käufer nicht an. Dieser Misserfolg soll durch die neue Beleuchtung in Zukunft vermieden werden.

Bemerkenswert ist schliesslich das unterirdische Kraftwerk Soverzene in Italien. Der Eingangstunnel ist indirekt beleuchtet mit 20 W Leuchtstofflampen, die in Vouten an beiden Seiten des tunnels angeordnet sind. Im Generator-Raum rufen Leuchtstofflampen hinter Fenstern aus streuendem Glas den Eindruck normalen Tageslichtes hervor. Hinter jedem dieser " Fenster " sind 12 40 W-Lampen in Reflektoren angebracht, $E_{mittel} = 40$ lx.

Strassen-Beleuchtung

Aus fast allen Ländern kamen zahlreiche Abbildungen neuer Strassenbeleuchtungs-Anlagen. Es ist klar, dass überall die Bedeutung der Strassenbeleuchtung erkannt wurde.

Die Fachleute in den Gemeindewesen Südafrikas sind sich in den letzten Jahren immer stärker der Notwendigkeit der Strassenbeleuchtungs-Verbesserung bewusst geworden. Beispiele aus den europäischen Städten wurden aufgegriffen. Ein besonderes Problem liegt darin, dass verhältnismässig kleine Gemeinden für grosse Strassenabschnitte zuständig sind, die finanzielle Belastung

demzufolge hoch ist. Die üblichen geschlossenen Leuchten für Leuchtstofflampen sind zu teuer, deshalb werden offene Leuchten für 2×20 bis zu 4×80 W-Lampen verwendet. Bei der abgebildeten Leuchte sind Lampen und Vorschaltgeräte auf dem abnehmbaren Reflektor montiert.

In Neu-Seeland wird besondere Aufmerksamkeit den seitlich angeordneten geschlossenen Strassenleuchten mit 100 bis 150 W-Glühlampen geschenkt. Die früher meist verwendeten offenen Leuchten bewährten sich nicht wegen der geringen Lampen-Lebensdauer und hohen Wartungskosten. Die Frage der Lampen-Lebensdauer war für einige Gebiete besonders in Süd-Island die Schaltung in Serie beizubehalten. Der Anteil der Leuchtstofflampen für Strassenbeleuchtungszwecke ist im vergangenen Jahr in Nord- und Süd-Island etwas angestiegen.

Vor einigen Monaten wurde über die Versuchsanlage einer Strassbenbeleuchtung in den USA berichtet. Durchgehende Lichtbänder mit Leuchten für Leuchtstofflampen wurden parallel zu den Bordsteinkanten über diesen in 7,5 m Höhe angeordnet. Es wurde angegeben, dass diese Beleuchtung gleichmassig sei und störende Leuchtdichte-Unterschiede nicht auftreten. Die Anlage wird als versuch weiter unterhalten.

In Europa scheint das Problem der Strassenbeleuchtung mehr wirtschaftlicher als technischer Natur zu sein. In Belgien nimmt der Energieverbrauch für Strassenbeleuchtung ständig in einem grösseren Masse als für andere Verbrauchsgruppen zu. Im Allgemeinen finden polierte offene Alu-Reflektoren mit 40 W-Leuchtstofflampen, 125 und 250 W Quecksilberdampflampen mit Leuchtstoff und 140 W-Natriumlampen Verwendung.

In Holland werden ebenfalls Aluminium-Reflektoren bevorzugt. In einigen Provinzen sind offene Tiefstrahler mit symmetrischen oder asymmetrischen Reflektoren mehr oder weniger standardisiert. In Utrecht finden durchweg abgeschlossene Leuchten für Leuchtstofflampen Anwendung. Andere grosse Städte wie Amsterdam und Haag scheinen der Installation von Leuchtstofflampen zu widerstreben, obwohl Anlagen mit einfacheren Leuchten dieser Art nahezu in allen Gemeinden aus dem Boden schiessen.

In Jugoslawien wird beinahe jede neue Installation mit Leuchtstofflampen ausgeführt und eine neue Mastaufsatzleuchte erfreut sich grosser Beliebtheit.

Madrid war noch vor fünf Jahren eine kärglich beleuchtete Stadt und gehört heute zu den aussergewöhnlich gut beleuchteten. Es gibt freilich noch grosse Teile, in denen die alten Leuchten ausgewechselt und ersetzt werden müssen. Die Arbeit der letzten fünf Jahre wird daraus ersichtlich, dass in diesem Zeitraum 23,155 neue Leuchten sowohl in den Vororten, wie im Stadtkern und den Hauptstrassen installiert wurden. Verschiedene Leuchtenformen fanden Anwendung mit Leuchtstofflampen, Mischlicht und Quecksilberdampflampen. In den repräsentativen Strassen werden mit 1000 W-Quecksilberdampflampen mit Leuchtstoff Beleuchtungswerte von etwa 30 lx auf der Strassenoberfläche erreicht. Auf diese Weise sind 533 km neu beleuchtet. In den Wohngebieten der Stadt wurden die vorhandenen Laternen moderniesiert.

In Frankreich haben finanzielle Schwierigkeiten, die nicht zuletzt durch die Kriegsfolgen bedingt sind, einer Verbesserung der Strassenbeleuchtung im Wege gestanden. Der Standard der Beleuchtung lässt deshalb in manchen Städten etwas zu wünschen übrig und manche Hauptstrassen zeigen in der Nacht unzusammenhängende Abschnitte die gut, schlecht oder garnicht beleuchtet sind. Daneben gibt es in jüngster Zeit erwähnenswerte Installationen. Uber die Beleuchtung der Champs Elysées wurde in *Light and Lighting*, September, 1956, S. 234, berichtet. Ebenso sind verschiedene Hauptstrassen in Paris neu beleuchtet. Es ist bekannt, dass die Pariser ihre eigene Stellung zu den Lichtfarben haben und deshalb die meisten der neuen Installationen in der Stadt mit Glühlampen, einer Mischung von Quecksilberdampf mit Leuchtstoff plus Glühlampen oder Leuchtstofflampen ausgeführt wurden. Uber eine Reihe weiterer interessanter Anlagen in anderen Teilen Frankreichs wird in einer der folgenden Ausgaben von *Light and Lighting* berichtet. Die Beleuchtung des Jenner Tunnels in Le Havre ist in der Ausgabe vom November 1956 besprochen.

Als zugehörig zur Strassenbeleuchtung wurden Abbildungen beleuchteter Brücken in Brasilien, Belgien und Holland aufgenommen. Auch die Beleuchtung der Richmond-San-Rafael-Brücke über die San Francisco Bay verdient Erwähnung. Es ist die längste Hochbrücke der Welt, der Abschnitt, der über das Wasser führt, hat eine Länge von 6,4 km, die Anschlussteile kommen mit 2,4 km Länge hinzu. Die Brücke ist doppelstöckig, wobei die einzelnen Bahnen dem Verkehr nach dem Osten bzw. Westen dienen. Die gesamte Brücke wird durch 422 Laternen (mit je 4 Leuchtstofflampen) beleuchtet, diese verteilen sich mit 332 auf die beiden Stockwerke, 32 auf das Zollgebiet und 58 auf die Zufahrten. Im oberen Stock sind die Leuchten an Auslegermasten in Höhen zwischen 8-9 m, bei Abständen von 42-46 m angebracht, im unteren Stock an Auslegern (an den Trägern des Oberdecks befestigt) bei Höhen von 6,75 bis 7,35 m bei Abständen von 33 bis 40 m.

Andere Innenräume

Hier ist eine Aufnahme des Flughafens von St. Louis eingefügt worden, der hauptsächlich mit Quecksilberdampflampen mit Leuchtstoff ausgestattet ist. Diese sind oben in den Kiosks angeordnet, welche die Bahn umgeben. Eine Zusatz-Beleuchtung im Oberlicht sorgt nicht allein für kontrastierendes Licht im Innern, sie gibt auch dem Ausseren in der Nacht interessante Züge.

Aus Südafrika kommt das Beleuchtungsbeispiel von Wählergestellen mit Leuchtstofflampen, wo bisher Glühlampen üblich waren. Leuchtstofflampen sind hierfür offensichtlich vorteilhafter und erleichtern die Wartung der Telefon-Anlagen.

Die zwei norwegischen Innenräume geben weitere Beispiele norwegischer Leuchtengestaltung. Die Aufnahme des Krankenhauses Foch lässt nicht ohne weiteres den Einbau der Leuchten in einer Gipsform erkennen. Bei dem Schlachthaus in Köln ist die Aufhängung der Leuchten an Spannseilen bemerkenswert.

Verschiedenes

Wenn wir auch versuchen die Uberschrift "Verschiedenes" zu umgehen, so lässt sich das manchmal nicht vermeiden. Daraus darf nicht gefolgert werden, dass die hierin eingeschlossenen Beispiele weniger wichtig sind als die bisher behandelten.

Das neue Lampensystem der Amerikaner für das Fernlicht mag beispielsweise von weitreichendem Einfluss auf die Auto-Beleuchtung der ganzen Welt sein. Es wurde in verschiedene 1957-Modelle in den USA eingebaut und besteht aus 2 Paaren gleichartiger Lampenscheinwerfer die je rechts und links des Wagens angeordnet sind. Jedes Paar besteht aus einer 37,5 W-Lampe mit oberer Lichtausstrahlung und einer von 37,5 plus 50 W, mit Glühwendel für obere und untere Ausstrahlung. Bei freier Fahrt brennen alle 4 oberen Wendel, das abgeblendete Licht wird durch die zwei 50 W-Wendel erreicht. Die Lampenpaare können über- oder nebeneinander angeordnet werden.

Die abgebildete deutsche Gleisfeld-Flutlichtleuchte ist für die Ablaufberge von Verschiebebahnhöfen bestimmt. Sie besteht aus 3 Aluspiegel-Halbleuchten, jede enthält eine 40 W-Leuchtstofflampe. Die Lampen 1 und 2 ergeben eingeschaltet symmetrische Breitstrahlung, mit 1 und 3 einseitige Lichtausstrahlung.

Das Bild der Füllstation in Argentinien zeigt die Spezialanordnung einer Leuchtstofflampe für die Einzelbeleuchtung der Pumpen und einer hoch aufgehängten Allgemeinbeleuchtung mit Quecksilberdampflampen mit Leuchtstoff.

Die Mitarbeiter der Ubersicht

Die Ubersicht ist von G. F. Cole zusammengestellt und beruht auf Unterlagen, die von vielen willigen und fleissigen Korrespondenten aus den verschiedenen Ländern zusammengetragen wurden. Ohne diese Zusammenarbeit wäre eine derartige Ubersicht unmöglich. Demzufolge gilt unser Dank:

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Die französische Ubersetzung wurde von Andre Boereboom, die deutsche von Ernst Rebske bearbeitet.

Tour d'Horizon International

Dans ce tour d'horizon international l'attention est attirée uniquement sur les progrès principaux et sur les tendances essentielles. Les détails qui suivent résultent des informations fournies par nos correspondants de 17 pays différents et ils donnent une bonne idée de la pratique de l'éclairage dans ces pays. On y signale plusieurs perfectionnements dans les sources lumineuses et dans les applications de l'éclairage et des renseignements nous sont parvenus de pays qui ne furent pas mentionnés dans les tours d'horizon précédents. Cet article retient l'attention des 56 pays où la revue *Light and Lighting* est disponible; pour la facilité de nos lecteurs d'outre-mer ce texte a été traduit aussi en français et en allemand.

Sources de Lumière

Il semble que la plupart des pays d'où nous avons reçu des renseignements utilisent maintenant couramment les lampes à incandescence à miroir incorporé, les lampes fluorescentes à réflecteur et les lampes à vapeur de mercure à couleurs corrigées, etc.

Dans le domaine des lampes à incandescence beaucoup de pays qui, auparavant devaient importer ces lampes, les fabriquent actuellement eux-mêmes, du moins en partie. En Yougoslavie on fabrique actuellement la lampe opalisée intérieurement. Au Brésil 97 pour-cent de matières premières sont produites dans le pays et une usine utilise des filaments obtenus au moyen de minerais brésiliens. En Finlande on fabrique actuellement à peu près toutes les lampes à incandescence nécessaires pour les besoins propres du pays et il est intéressant de noter que, en raison du prix élevé des lampes et du prix relativement bas de l'électricité, la durée moyenne de vie des lampes y est portée à 1500 h. Les progrès dans la fabrication des lampes se rapportent à l'augmentation du rendement lumineux et à une réduction de prix de 15 pour-cent. Des lampes à réflecteur colorées ont été introduites. Au Brésil on a introduit les lampes à filament vertical pendant l'année écoulée.

Aux Etats-Unis on constate que la lampe à couleur de rose, introduite il y a deux ans afin d'apporter une teinte plus chaude à l'éclairage incandescent, a maintenant un concurrent dans la lampe à couleur corrigée vers l'autre extrémité du spectre et utilisée là où une lumière froide et reposante est requise.

On annonce d'autre part une gamme de lampes colorées en rouge, vert, bleu et teinte pastel, de sorte que la ménagère peut maintenant utiliser à sa guise la lumière chaude ou la lumière froide et que, sans aucun doute, elle utilisera les deux en même temps.

La tendance, déjà signalée pour d'autres pays, d'utiliser des lampes à incandescence de plus en plus puissantes, est aussi applicable à la Nouvelle-Zélande où la demande pour des lampes de 40 W diminue en faveur des lampes de 100 et de 150 W.

La préférence pour la coloration des lampes fluorescentes semble être la même que celle signalée l'année passée. Aussi bien en Nouvelle-Zélande qu'en Finlande, on demande surtout des lampes à teinte chaude. Dans ce dernier pays, il y a vraisemblablement plusiers raisons pour justifier ce choix: le climat froid en hiver, l'utilisation de la lumière artificielle durant la plus grande partie de la journée, la faible durée de la lumière naturelle, etc. Il en résulte que la lumière artificielle doit être aussi attrayante que possible.

La nouvelle production des lampes en Finlande comprend des tubes de 15 et de 30 W. L'Italie signale l'introduction d'une lampe fluorescente de 15 W ayant la forme d'une bougie et munie d'un socket à une extrémité. Cette lampe est fabriquée en 4 tons blancs, et exige un appareillage auxiliaire spécial pour raccordement sur le réseau alternatif. En 1956 on a commencé à fabriquer au Brésil les lampes à allumage rapide ainsi que leurs auxiliaires.

En Italie et en Yougoslavie le demande pour les lampes fluorescentes s'accroît de plus en plus. A Zagreb on a installé une nouvelle machine pour accroître la production et on y fabrique des lampes de 20 et 40 W ainsi qu'une lampe de 65 W.

Les Etats-Unis signalent deux perfectionnements en vue d'augmenter le rendement lumineux des tubes fluorescents. On déclare que la lampe "Power Groove" fabriquée par la General Electric donne deux fois plus de lumière que les lampes actuelles de même longueur. Cette augmentation est obtenue au moyen d'une série d'échancrures longitudinales placées d'un côté du tube. La diminution de la section intérieure permet une charge plus élevée qui, combinée avec la plus grande surface du tube, donne un accroissement de flux lumineux. Ce perfectionnement se rapporte à la lampe de 200 W de 8 pieds de longueur et à la lampe de 100 W de 4 pieds de longueur, et on prévoit l'application à d'autres types de lampes. La lampe Sylvania VHO est supposée donner 2½ fois autant de lumière que la lampe normale. Le tube de verre est inchangé, mais la lumière supplémentaire est obtenue au moyen d'un remplissage de néon et de mercure au lieu de l'argon et du mercure. Cette lampe peut être obtenue pour une puissance de 100 W et de 200 W. Ces deux perfectionnements sont très intéressants et on peut prévoir une série d'application due à l'augmentation du flux lumineux.

Il y a quelques mois Westinghouse a fait une démonstration de l'éclairage d'un local obtenu au moyen de l'électroluminescence. Les murs et les plafonds du local ont été recouverts au moyen de 112 panneaux ayant chacun un pied carré et donnant une lumière verte et une brillance de 100 lumen par pied. La tension d'alimentation était de 350 V, 3000 Hertz; le rendement lumineux était de 3 lumen/W.

Sylvania, qui se proclame l'unique firme américaine mettant sur le marché les lampes à électroluminescence, signale que la lampe en verre est remplacée par une feuille d'acier recouverte d'un mélange de céramique et de phosphore ainsi que d'une solution d'étain protégée par une surface transparente d'un composé conducteur en étain.

Les lampes à vapeur de mercure à teinte normale ou à lumière corrigée trouvent beaucoup d'application. En Belgique, où la lampe à teinte corrigée est déjà utilisée depuis de nombreuses années, la tendance consiste à adopter de plus en plus des lampes de 80, 125, 250 et 400 W pour l'éclairage public. En Nouvelle-Zélande et ailleurs l'intérêt se porte surtout aux lampes à teinte corrigée, mais le prix élevé de ces lampes réduit leur utilisation. On signale qu'une lampe de 50 W à lumière corrigée a été introduite l'année passée par Osram en Allemagne; elle est disponible maintenant en Italie où on utilise aussi beaucoup de lampes ordinaires à vapeur de mercure pour l'éclairage extérieur et l'éclairage des bâtiments.

Il y a peu à dire au sujet des lampes à vapeur de sodium. Toutefois la nouvelle lampe anglaise solidaire de sa cloche à vide a été accueillie avec intérêt et il paraît que la ville de Wellington a décidé d'adopter cette lampe pour son important programme d'éclairage public.

En ce qui concerne les nouvelles sources de lumière, signalons la lampe Sylvania "RF" fonctionnant au moyen d'énergie à fréquence radiophonique et qui a une luminance plus grande que les lampes à incandescence, ce qui permet son emploi dans des appareils de projection, d'impression de films et de recherches médicales.

A propos d'appareils de projection notre correspondent de Nouvelle-Zélande signale que l'arrivée dans son pays de nouvelles lampes de projection anglaises et continentales rend le choix de la lampe difficile. La photographie en couleur est très populaire en Nouvelle-Zélande et il y a actuellement une grande demande pour des lampes photographiques et de projection. Mais le choix serait facilité s'il y avait une standardisation et une diminution du nombre de types de lampes. L'avenir immédiat n'est cependant pas très favorable car on tend de plus en plus à utiliser des projecteurs de dimensions réduites, ce qui nécessite l'utilisation de lampes placées horizontalement au lieu des lampes verticales précédentes. La General Electric et Sylvania annoncent la sortie de nouvelles lampes; le nombre de types augmentera donc au lieu de diminuer.

Armatures d'Eclairage

Il résulte de la documentation que nous avons reçue de plusieurs pays que la tendance actuelle est centrée sur l'effet décoratif qui peut être obtenu avec les

armatures à incandescence alors qu'il y a quelques années on essayait surtout d'augmenter l'aspect et le rendement des armatures à tubes fluorescents. (On peut s'étonner pourquoi les fabricants ont abandonné la tâche ingrade d'étudier des armatures décoratives à tubes fluorescents.)

Le seul exemple d'une armature tubulaire à usage industriel vient d'Allemagne où on prévoit un nouveau type pour utilisation dans une atmosphère corrosive. C'est une armature en plexiglas dans laquelle les vis et le système de la fermeture sont convenablement protégés contre la corrosion.

On utilise de plus en plus les matières plastiques, tant pour les louvres que pour la fermeture des armatures. L'armature australienne ici reproduite indique la tendance actuelle de la fabrication dans ce pays. Le louvre est fait en polystyrene moulé et assemblé au moyen de 3 montants longitudinaux. La forme du louvre est celle généralement approuvée dans ce pays. Les illustrations reproduisent aussi les armatures utilisées en Finlande, dans les pays Scandinaves et en Italie. Ces contrées ont influencé la tendance des autres pays quoique les matériaux utilisés peuvent y être différents. La demande de luminaires modernes augmente dans toutes les parties du monde. Les photos reproduisent quelques types étudiés et réalisés en Afrique du Sud. On constate aussi en Nouvelle-Zélande que la demande pour des armatures modernes avec lampes à incandescence augmente de plus en plus, et on constate par exemple à la gare terminale de Whenuapai, Auckland, que le choix s'est porté sur ces armatures alors que, il y a quelques années on aurait, sans aucun doute, utilisé des tubes fluorescents. Les plafonds lumineux ont aussi fait leur apparition en Nouvelle-Zélande. Le Brésil a une industrie florissante d'armatures et l'importation de ces appareils diminue de plus en plus.

Il est dommage que peu d'informations nous soient parvenues au sujet d'armatures encastrées dans les plafonds; il y a eu cependant un grand développement de ces appareils dans le Royaume-Uni et aux Etats-Unis. En Belgique on utilise beaucoup ces armatures encastrées et en Finlande le choix se porte surtout sur les réflecteurs en aluminium anodisé pour cette application.

Aux Etats-Unis on a introduit des panneaux en matière plastique pouvant être utilisés séparement ou comme partie d'un plafond lumineux. Ces panneaux sont munis de petites lentilles destinées à diminuer la brillance.

Des exemples d'armatures modernes se trouvent dans les autres chapitres de cet article.

Floodlighting

Alors que les illustrations se rapportant à ce chapitre concernent surtout des installations importantes, il y a eu cependant plusieurs applications de ce genre d'éclairage à des installations plus réduites. C'est ainsi qu'à Madrid on a éclairé par ce moyen une série d'endroits intéressants dans la vieille cité en même temps qu'on a éclairé les grands bâtiments publics.

Un des exemples signalés par l'Italie est celui de l'éclairage de la façade du Dôme de Piacenza; il montre le soin apporté dans la réalisation de telles installations. Cette façade est surtout intéressante à voir le soir au soleil couchant et on a essayé d'obtenir le même effet au moyen de l'éclairage artificiel en plaçant tous les projecteurs sur les bâtiments voisins situés d'un même côté de cette façade. Deux projecteurs de 1.500 W sont dirigés sur cette façade. Un autre projecteur illumine la tour et six projecteurs de 500 W munis de réflecteurs dirigent la lumière en différents endroits afin d'accentuer les ombres.

Ce type déclairage n'est cependant pas uniquement confiné aux vieux bâtiments, car beaucoup de pays ont éclairé de cette façon des bâtiments commerciaux et industriels. Dans certains cas cet éclairage sert à de multiples usages; c'est le cas du Chief Joseph Dam à Washington où l'éclairage procure une attraction pour les touristes et augmente la sécurité du travail d'entretien.

Les entreprises commerciales du Brésil se rendent compte de la valeur publicitaire de cet éclairage; il en est de même en Allemagne où des usines et des bureaux sont éclairés en même temps que les cathédrales. Notre correspondant belge aime beaucoup les ponts et la photo ci-jointe montre l'éclairage d'un nouveau pont à Huy sur la Meuse. Il y a maintenant beaucoup d'endroits dans la vallée de la Meuse qui sont éclairés pour la grande joie des touristes.

Eclairage des Terrains de Sport

On éclaire de plus en plus les terrains de football. Aussi, nous avons été surpris d'apprendre que, jusq'à l'année passée, aucun terrain de football n'était éclairé en permanence en Allemagne. Mais à la grande satisfaction des amateurs de ce sport, il y a, depuis peu de temps, plusieurs installations d'éclairage convenablement réalisées. Au terrain de Offenbacher Kickers on a monté 96 projecteurs de 1,000 W sur chacun des 4 pylônes de 21 m de haut, ce qui donne un éclairement moyen sur le terrain de plus de 100 lux. Au nouveau stade de Leipzig, pouvant accueillir 100.000 spectateurs, 4 pylônes métalliques soudés supportent un total de 60 projecteurs de 5 kW disposés à 39 m de hauteur donnant un éclairement moyen de 80 lux. Il est intéressant de signaler un essai d'éclairage au moyen de tubes fluorescents au terrain du Eintracht à Frankfurt s/M. Il est prévu 60 armatures comprenant chacune 5 lampes de 65 W placées à 12 m de hauteur.

Une autre installation nouvelle est celle mise en service en octobre dernier pour l'éclairage du Claudelands Showground pour l'Association Agricole de Hamilton. Ce terrain est destiné surtout aux expositions agricoles, mais on l'utilise aussi pour des activités sportives, et l'éclairage a été réalisé de façon à pouvoir servir dans les deux cas. Les poteaux sont mobiles et peuvent être placés aux endroits convenables; chaque poteau supporte 10 projecteurs de 1500 W placés à une hauteur de 15m. Les poteaux sont équilibrés et peuvent être abaissés par un seul homme pour l'entretien ou le renouvellement des lampes. Le terrain du Maracana, à Rio de Janeiro est certainement le plus grand du monde, car il peut contenir 200,000 spectateurs. Les projecteurs sont montés au sommet de la tribune. Nous ne possédons malheureusement pas de détails au sujet de cette installation mais, avec l'aide d'une loupe, le lecteur pourra, s'il le désire, compter le nombre de projecteurs. Nous sommes arrivés ainsi à en compter 104 et il y en a vraisemblablement autant de l'autre côté du terrain.

En ce qui concerne les terrains de sport intérieurs, signalons celui du palais des Sports de Cologne. C'est un bâtiment en béton armé avec un dôme elliptique en tubes d'acier. L'acoustique a été spécialement étudié. Un revêtement spécial du sol absorbe le bruit et le plafond est recouvert de panneaux absorbants. Ce bâtiment couvert de 7.000 m^2 permet les réunions de basketball, d'athlétisme et de boxe. L'éclairage de la partie centrale est réalisé au moyen de 48 réflecteurs disposés au plafond. Il y a aussi 4 projecteurs centraux donnant un éclairement moyen de 550 lux. Les réflecteurs encastrés dans le plafond sont munis de lampes de 1000 W—220 V surchargées à 240 V au moment des compétitions. Lors d'un match de boxe on utilise en outre 20 projecteurs de 1500 W disposés en cercle au plafond et donnant un éclairement sur le ring de 2,500 lux. L'éclairage de la tribune est réalisé au moyen de 48 lanternes en perspex comprenant chacune 6 tubes fluorescents de 40 W réglés au moyen d'un thyratron pendant les concerts ou les spectacles de théatre. L'éclairage indirect des plafonds des corridors complète l'ensemble.

Eclairage des Magasins

Il est difficile de passer en revue l'éclairage des magasins car chaque fois qu'un nouveau magasin est construit l'architecte désire se surpasser. Quoiqu'on utilise généralement des tubes fluorescents, il semble cependant que l'on tende de plus en plus vers une combinaison intelligente de tubes fluorescents et de lampes à incandescence. Les photos relatives à ce chapitre montrent des magasins vendant des produits de toutes sortes, depuis la tasse de thé jusqu'à l'automobile, et nous y avons ajouté des bureaux de renseignements et des vitrines d'exposition.

Eclairage Industriel

A trois exceptions près, toutes les installations qui nous ont été signalées utilisent des tubes fluorescents à cathode chaude. Les exceptions concernent la centrale de Birsfelden en Allemagne où l'on utilise des lampes à incandescence de 500 W, l'usine Santo André de la General Electric au Brésil, qui utilise un mélange de lampes à incandescence et à vapeur de mercure, et une autre usine de la General Electric à Erie (U.S.A.) qui est la première usine éclairée au moyen des nouvelles lampes à incandescence (750 W) à filament axial.

La principale réalisation de l'année est probablement celle du Centre Technique de la General Motors à Detroit (voir *Light and Lighting*, août 1956, page 209). Une autre installation intéressante est celle des studios de la Chrysler Corporation située elle aussi à Detroit (voir *Light and Lighting*, février 1957, page 4). Le studio mesure 70 x 110 ft (21 x 33 m) et a un plafond elliptique qui se prolonge jusqu'au sol, d'un côté du studio. Un plafond lumineux, type "Wakon" comprenant 1.209 lampes fluorescentes de 1,20 m procure un éclairement de 800 ou 1.600 lux. Il semble que les dessinateurs de voitures automobiles doivent travailler sous un éclairement voisin de l'éclairement diurne; l'installation ci-dessus respecte cette condition et elle permet de travailler à l'abri des changements atmosphériques. Les chambres de modelage (165 x 17 m) ont aussi des plafonds "Wakon" donnant 750 lux. On peut se demander pourquoi ces sociétés d'automobiles ont fait des installations d'éclairage aussi coûteuses. L'explication en est que des modèles donnant satisfaction à la lumière artificielle se sont révélés invendables lorsqu'ils sont vus à la lumière naturelle. Il faut donc que les conditions de travail soient analogues à celles que l'on trouve en plein jour.

Il convient de signaler aussi l'éclairage de la centrale de Soverzene en Italie, dont l'entrée est éclairée en lumière indirecte au moyen de lampes fluorescentes de 20 W placées dans une moulure des deux côtés du tunnel. Le local des générateurs est éclairé au moyen de lampes fluorescentes placées derrière les fenêtres de façon à donner l'impression de lumière naturelle venant du dehors. Des réflecteurs assurent une répartition égale de la lumière sur la surface des fenêtres. Chaque fenêtre est éclairée par 12 lampes de 40 W. L'éclairement obtenu est de 40 lux et il n'y a aucun éblouissement.

Eclairage des Rues

Beaucoup de photographies d'éclairage de rues nous sont parvenues. Comme il n'est pas possible de les reproduire toutes, le choix de la publication s'est limité aux plus intéressantes.

En Afrique du Sud on se rend compte de plus en plus de l'importance d'un bon éclairage public et l'exemple des villes Européennes y est suivi. Les municipalités sud africaines ont peu d'habitants mais beaucoup de routes; les frais d'éclairage des routes sont donc une lourde charge pour les habitants. On ne peut dès lors utiliser des armatures fermées à tubes flourescents et on doit s'y contenter d'armatures ouvertes munies, par ex., de 2 tubes de 20 W ou de 4 tubes de 80 W. La photo montre une pareille armature comprenant essentiellement un support central abritant l'appareillage et les lampes. Le réflecteur y est fixé après l'établissement des connexions. L'ensemble est émaillé au four.

En Nouvelle-Zélande on attache maintenant plus d'attention à l'éclairage des rues secondaires et on y utilise souvent des armatures fermées munies de lampes à incandescence de 100 à 150 W. Auparavant on se contentait d'utiliser des lampes de 100 W., placées dans des armatures ouvertes. Mais la durée de vie des lampes était relativement réduite, et l'entretien et le renouvellement fréquent de ces lampes entraînaient des suppléments de frais importants. La faible durée de vie des lampes a arrêté la réalisation de plusieurs nouvelles installations, spécialement dans l'Ile Méridionale. A Christchurch on a installé récemment des armatures avec réfracteurs intérieurs et diffuseurs extérieurs. L'utilisation de tubes fluorescents s'est légèrement accrue ces derniers temps. C'est Auckland qui a le plus d'installations à tubes fluorescents, mais les petites villes commencent à suivre son exemple, surtout si elles se trouvent près d'une autoroute. Les autres centres utilisant ces lampes sont Hutt City et Christchurch. Wellington reste en retard (à cause du vent) et il en est de même pour Dunedin, mais pour d'autres motifs. Les villes de Auckland et de Wellington discutent encore les mérites respectifs des lampes au mercure et au sodium.

On signale peu de progrès en Australie, mais on y utilise cependant de plus en plus la lampe MBF qui remplace la lampe MA, et on doit signaler une installation au voisinage du champ d'aviation de Sydney avec armatures arrêtant toute lumière vers le haut et munies de lampes à vapeur de mercure de 125 W et 250 W. Il y a quelques mois on a expérimenté aux Etats-Unis un nouveau système réalisé au moyen d'une ligne continue d'armatures fluorescentes parallèles à l'axe de la route placées à 7,5 m de hauteur. Ce système donne évidemment une très bonne uniformité d'éclairement. Les essais se poursuivent.

En Europe le problème de l'éclairage public est dominé par la situation économique. Toutefois on constate que en Belgique la consommation en énergie électrique pour l'éclairage public s'est accrue dans des proportions plus élevées que celle des autres usages. En général on y utilise des armatures ouvertes munies de réflecteurs en aluminium brillanté. La tendance actuelle y est d'utiliser le tube fluorescent de 40 W, la lampe à vapeur de mercure à couleur corrigée de 125 W et 250 W, et la lampe à vapeur de sodium de 140 W.

Aux Pays-Bas on utilise aussi des réflecteurs en aluminium poli et les armatures sont généralement du type cut-off et munies de réflecteurs symétriques ou non. La ville d'Utrecht est éclairée au moyen d'armatures complètement fermées, du type cut-off, munies de tubes fluorescents. D'autres villes telles que Amsterdam et La Haye hésitent à utiliser les tubes fluorescents, alors qu'on les voit apparaître de plus en plus dans les villages.

En Yougoslavie toute nouvelle installation est équipée de tubes fluorescents et une nouvelle armature placée au sommet du poteau s'y est révélée être très populaire.

Madrid qui, jusqu'il y a quelques années, était pauvrement éclairée, l'est actuellement très bien. L'important programme de modernisation de l'éclairage public, arrêté il y a 5 ans, n'est pas encore complètement réalisé. Néanmoins on peut signaler que, depuis cette époque, 23.155 nouvelles armatures ont été installées dans les faubourgs et dans la ville. On y a utilisé à la fois les lampes mixtes, les lampes fluorescentes de 40 W, les ballons fluorescents à teinte corrigée de 125, 250 et 400 W, et même, dans les grandes avenues des lampes de 1000 W donnant un éclairement moyen de 30 lux. Jusqu'à présent on a rééquipé 533 km de rues. Dans les quartiers résidentiels on s'est surtout borné à moderniser les armatures existantes de façon à augmenter leur rendement.

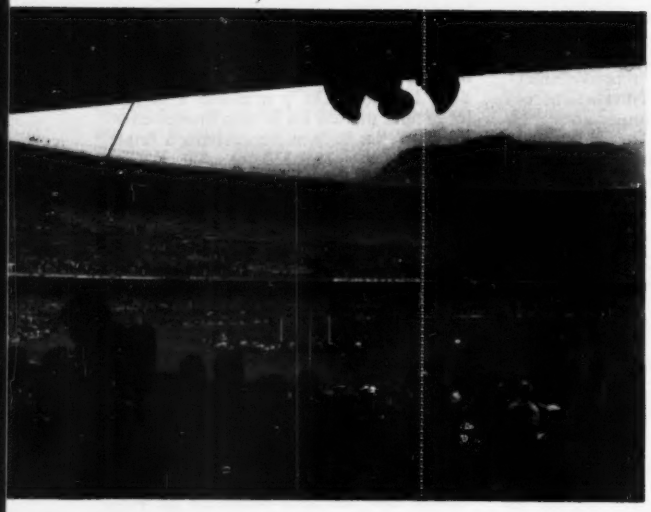
En France il est resté peu de crédits disponibles pour l'éclairage public, après l'effort tout spécial exigé par la reconstruction. Tout comme dans d'autres pays, la France souffre d'une surabondance d'autorités responsables de l'éclairage public. Il n'est pas surprenant, dès lors, que le niveau d'éclairement est encore très bas dans beaucoup de villes et que plusieurs routes importantes présentent la nuit une succession incohérente de tronçons bien éclairés, mal éclairés ou non éclairés. Il y a eu toutefois quelques réalisations remarquables. La modernisation de l'éclairage des Champs-Elysées a été décrite dans *Light and Lighting*, septembre 1956, page 234. Beaucoup d'autres routes principales à Paris ont été modernisées. Il est bien connu que les Parisiens sont sensibles à la couleur; c'est pourquoi presque toutes les nouvelles installations de la ville utilisent les lampes à incandescence, les lampes à vapeur de mercure à teinte corrigée ou les tubes fluorescents. Il y a eu aussi d'autres réalisations intéressantes qui feront l'objet d'un prochain article dans *Light and Lighting*. L'éclairage des tunnels du Havre a été décrit dans l'édition de novembre 1956 de cette revue.

Ce chapitre montre des photographies d'éclairage de ponts au Brésil, en Belgique et aux Pays-Bas. Il convient de signaler spécialement l'éclairage du pont traversant la baie de San Francisco. C'est le pont le plus long du monde; la partie surplombant l'eau atteint 4 miles auxquels il faut ajouter 1,5 miles pour les travées d'approche. C'est un pont à double voie; la voie supérieure est réservée au trafic allant vers l'Ouest, la voie inférieure est réservée aux voitures allant vers l'Est. L'éclairage est réalisé au moyen de 422 armatures munies de 4 tubes fluorescents. Sur la voie supérieure les armatures sont placées à 8 ou 9 m de hauteur avec une entredistance de 40 à 45 m. Sur la voie inférieure les armatures sont fixées à la charpente à une hauteur de 6,5 à 7 m et avec une entredistance de 33 à 39 m.

Autres Installations Interieures

Ce chapitre montre l'éclairage de la gare d'aviation de St. Louis réalisé au moyen de lampes à vapeur de mercure à teinte corrigée placées au sommet des constructions avoisinantes. Un éclairage supplémentaire est obtenu au moyen de lampes fluorescentes placées sur les toits ce qui donne non seulement un bon con-

(Continued on page 143)



The Maracana Stadium at Rio de Janeiro, probably the largest football ground in the world.

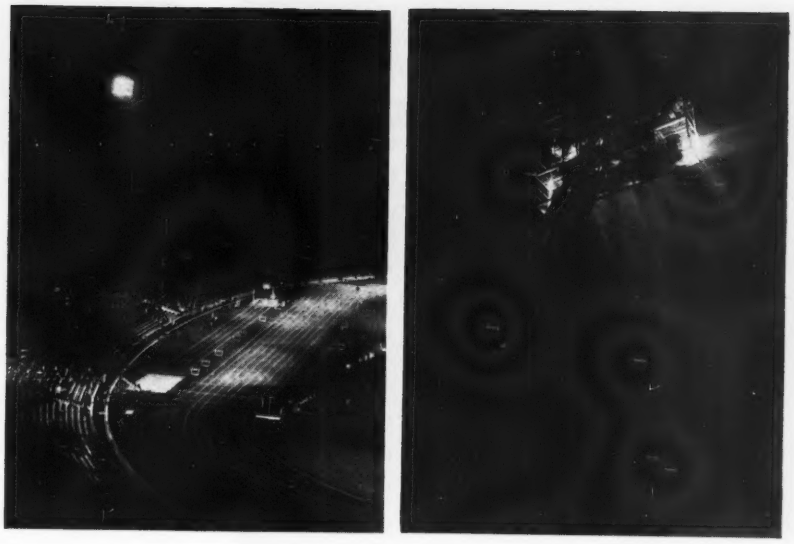
Sports Lighting

The accent this year is on the lighting of football fields. It came as a surprise to learn that until last year there was no permanent football lighting in Germany, but to the satisfaction of enthusiasts in that country there are now several first-class installations. At the ground of the Offenbacher Kickers, 96 1,000-watt floods are mounted on each of four 72-ft. towers giving an average illuminaton on the ground of 11 lm/ft^2. At the new stadium at Leipzig in East Germany (capacity 100,000 spectators) four braced 56-ft. towers on the top of the mound at a height of 130 ft. above the field carry a total of 60 5-kw. projectors giving an average illumination of 8 lm/ft^2. Of particular interest is a trial installation of fluorescent floodlights at the Eintracht ground at Frankfurt/Main. Sixty area floods mounted at 40 ft. each house five 65-watt lamps.

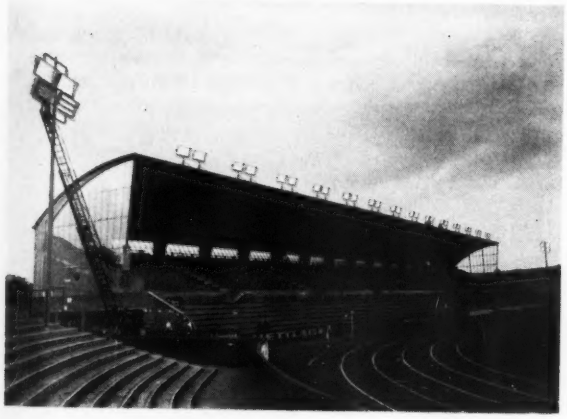
Another novel installation is that put into operation last October for the floodlighting of the Claudelands Showground of the Waikato Agricultural and Pastural Association in Hamilton. Although this ground is used for agricultural and pastural shows it is also used for sporting activities, and the floodlighting has been designed to cope with any of the purposes for which the ground is used. The floodlighting towers are mobile and can, therefore, be positioned to suit the various night events which may take place. Each of the four towers houses 10 1,500-watt floodlights at a height of 53 ft. above ground level. The towers are designed on the counterweight principle and can be lowered by one man for pre-setting, re-lamping or maintenance. A special scale fitted to each floodlight enables it to be pre-set as required.

For sheer size the Maracana ground at Rio de Janeiro takes some beating and as the ground holds over 200,000 spectators it may well be the largest in the world. Projectors are mounted on the top of the stand. Unfortunately no details are available on the installation though with the aid of a magnifying glass readers may be able to count the number of projectors along one side. We make it 104, the number, no doubt, being repeated on the other side of the ground.

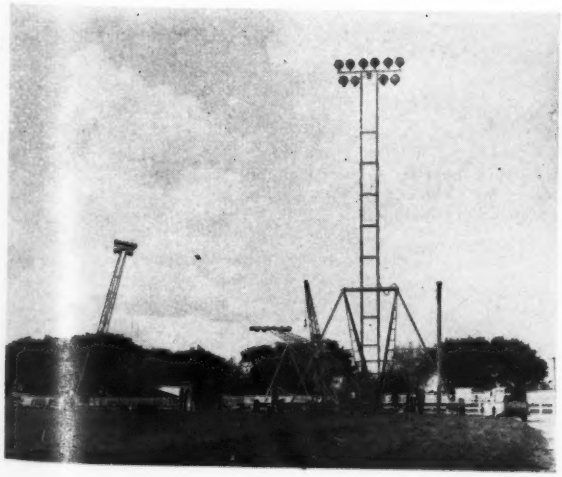
Turning to indoor sports the new Palazzo dello Sport in Bologna is of interest. This is a reinforced concrete building with an elliptical dome of steel tubes having a maximum diameter of 76 metres. The large central hall has had particular attention from the acoustic point of view. It has a special flooring to prevent noise and ceiling lined with anti-acoustic panels. In the building, which covers an area of about 7,000 square metres, are held basket-ball, athletic and boxing contests. The lighting of the central playing area is achieved by means of 48 reflectors arranged in a ring on the ceiling, plus four floodlights in a central ring, giving an initial average illumination of 55 lm/ft^2. These reflectors, completely sunk in the ceiling, contain 1,000-watt, 220-volt lamps which, during contests, are run at approximately 240 volts by means of an auto-transformer. For the lighting of the ring during boxing use is made of a further twenty 20-in. narrow beam 1,500-watt floodlights arranged in a circle within the ceiling giving an illumination on the ring of 250 lm/ft^2. For the lighting of the tribune there are 48 "Perspex" lanterns in which are mounted six 40-watt fluorescent lamps which may be gradually extinguished by means of a thyratron regulator on the occasion of concerts or theatrical performances. For aesthetic effect the ceiling of the corridor going round the building and the central core of the ceiling are indirectly lighted.

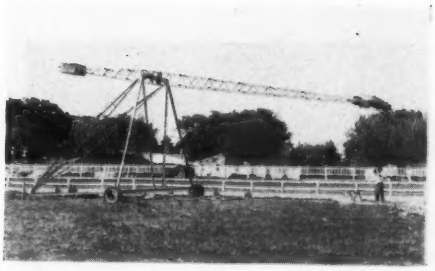


A new football stadium in Leipzig; right, a close-up of one of the towers. (VEB Leuchtenbau, Leipzig.)

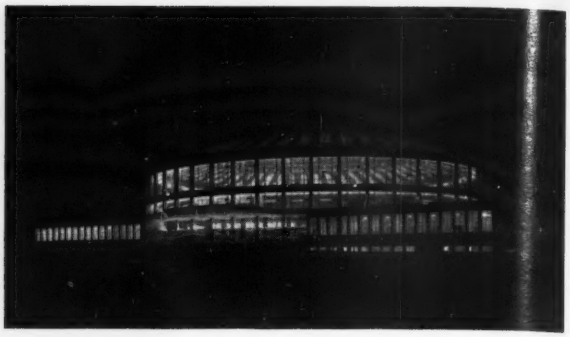


Experimental fluorescent floodlighting at the Eintracht Stadium, Frankfurt-on-Main.



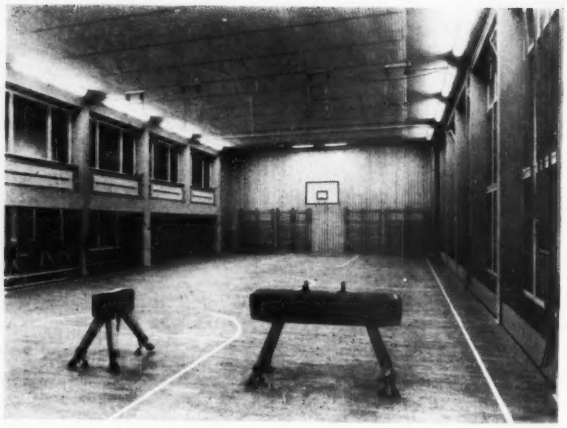


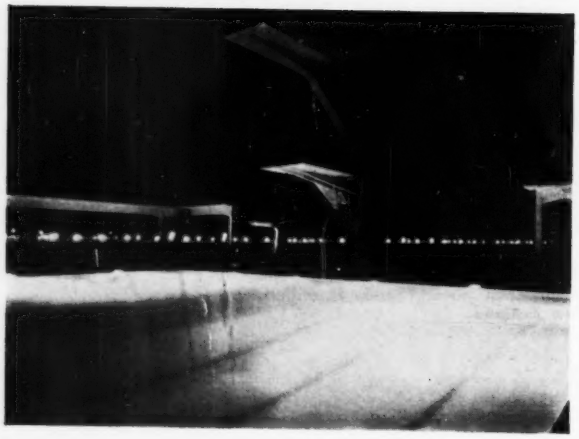
Movable floodlight towers at the Claudelands Showground, Hamilton, New Zealand.



Left, interior of the Palazzo dello Sport at Bologna; right, exterior by night. (Buini and Grandi, Bologna.)

Gymnasium at the Konrad-Hänisch School, Berlin. (Zeiss Ikon, Berlin.)





Underwater lighting in the swimming pool at the Club de Regatas Guanabara, Rio de Janeiro.

Industrial Lighting

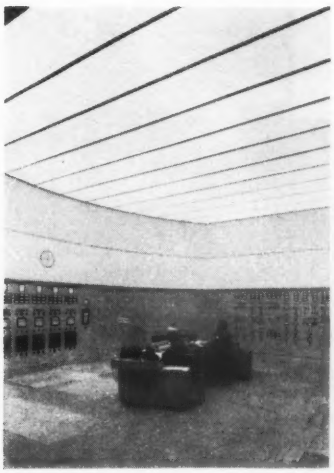
With three exceptions all the installations of which details or pictures have been received have hot cathode fluorescent lighting. The exceptions are the Birsfelden power station in Germany, where 500-watt tungsten reflector lamps are used, the Santo Andre factory of General Electric in Brazil, which has mixed mercury and tungsten, and another G.E. factory at Erie, U.S.A., which is the first factory to be lighted with the new tungsten lamps (in this case 750-watt) containing the axial filament.

The General Motors Technical Center at Detroit is probably the outstanding lighting installation of the year. (See *Light and Lighting*, August, 1956, page 209.) Another interesting installation in the same country is at the Chrysler Corporation styling studios, also in Detroit. The studio (see *Light and Lighting*, February, 1957, page 41) measures 70 ft. x 110 ft. and has an elliptical ceiling which reaches almost to the floor on one side of the room. A "Wakon" illuminated ceiling containing 1,209 4-ft. fluorescent lamps provides alternative illuminations of 79 or 159 lm/ft². Automobile designers apparently need to work under lighting conditions close to daylight; this installation produces such conditions and is independent of the weather. The new clay modelling rooms (496 ft. x 50 ft.) also have "Wakon" ceilings giving 75 lm/ft².

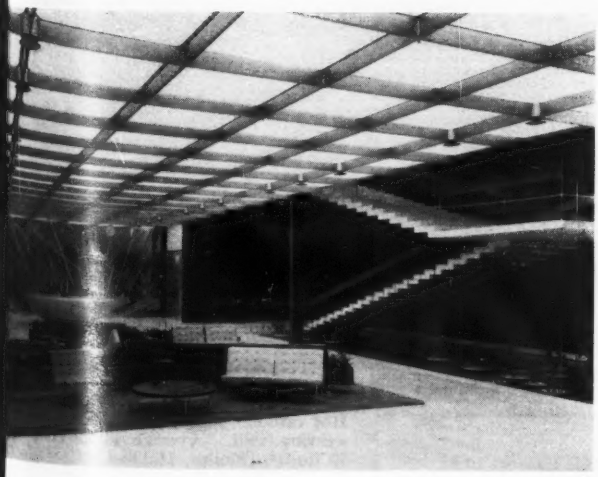
One may wonder why these automobile firms have gone in for such expensive lighting schemes. The reason is that in the past some models designed under artificial lighting with apparent success have proved to be quite unacceptable to the buying public when seen in broad daylight. The manufacturers are therefore prepared to spend vast sums of money on a lighting installation which will prevent losses such as have occurred in the past.

Worthy of note is the underground power station at Soverzene in Italy. The entrance tunnel is indirectly lighted by means of 20-watt fluorescent lamps installed in a special cornice on both sides of the tunnel. The lighting of the generator room is achieved by means of fluorescent lamps placed behind windows of refracting glass so as to give the impression of natural light coming from outside. The lamps are in reflectors which distribute the light evenly over the surfaces of the windows. Behind each window there are 12 40-watt lamps; lighting is even throughout the room at 4 lm/ft² and glare is negligible because of the very low luminance of the windows.

The power station at Soverzene, Italy. Above, the generator room; right, entrance to the tunnel. (SADE, Venice.)



"Lumenated" ceiling in the control room of a power station in Hamburg. (Thermotank, Hamburg.)

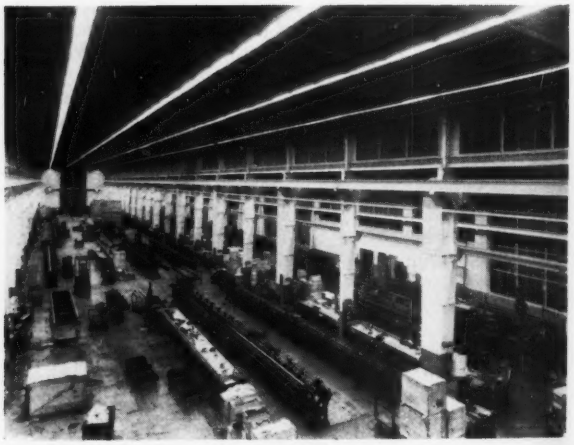


Illuminated ceiling at the General Motors Technical Center, Detroit. (Wakefield, USA.)

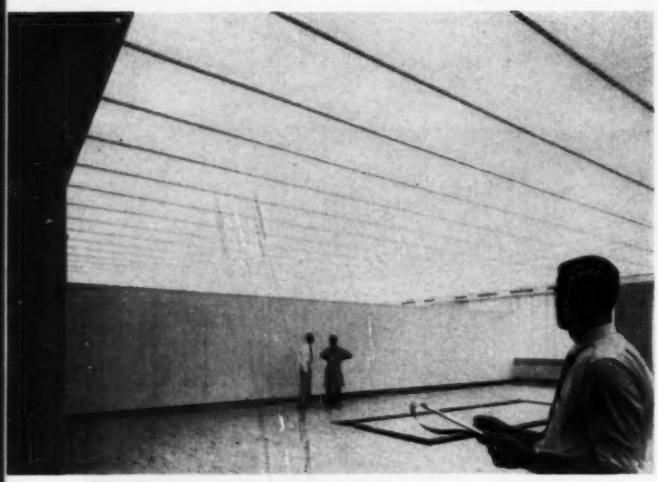
Generator room at the Birsfelen power station lit by 500-watt tungsten lamps in concentrating luminaires. (Zeiss Ikon, Berlin.)

Mixed mercury and tungsten lighting at the Santo Andre electric motor factory. (General Electric SA, Sao Paulo.)

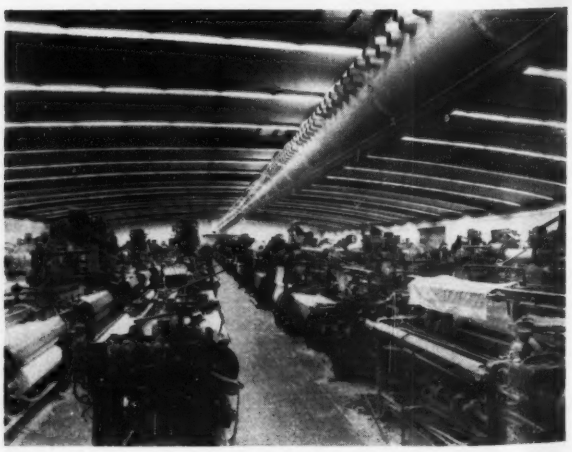
Fluorescent lamp luminaires mounted at 35 ft. in a tractor factory at Le Mans. (Philips, Paris.)



Hot cathode fluorescent lighting in a textile factory at Almelo, Holland. Average illumination is 50 lm/ft^2. (Philips, Holland.)



One of the modelling studios of the Chrysler Corporation, Detroit. (Wakefield, USA.)



Hot cathode fluorescent lighting in a weaving mill. Average illumination 40 lm/ft^2. (Philips, Holland.)

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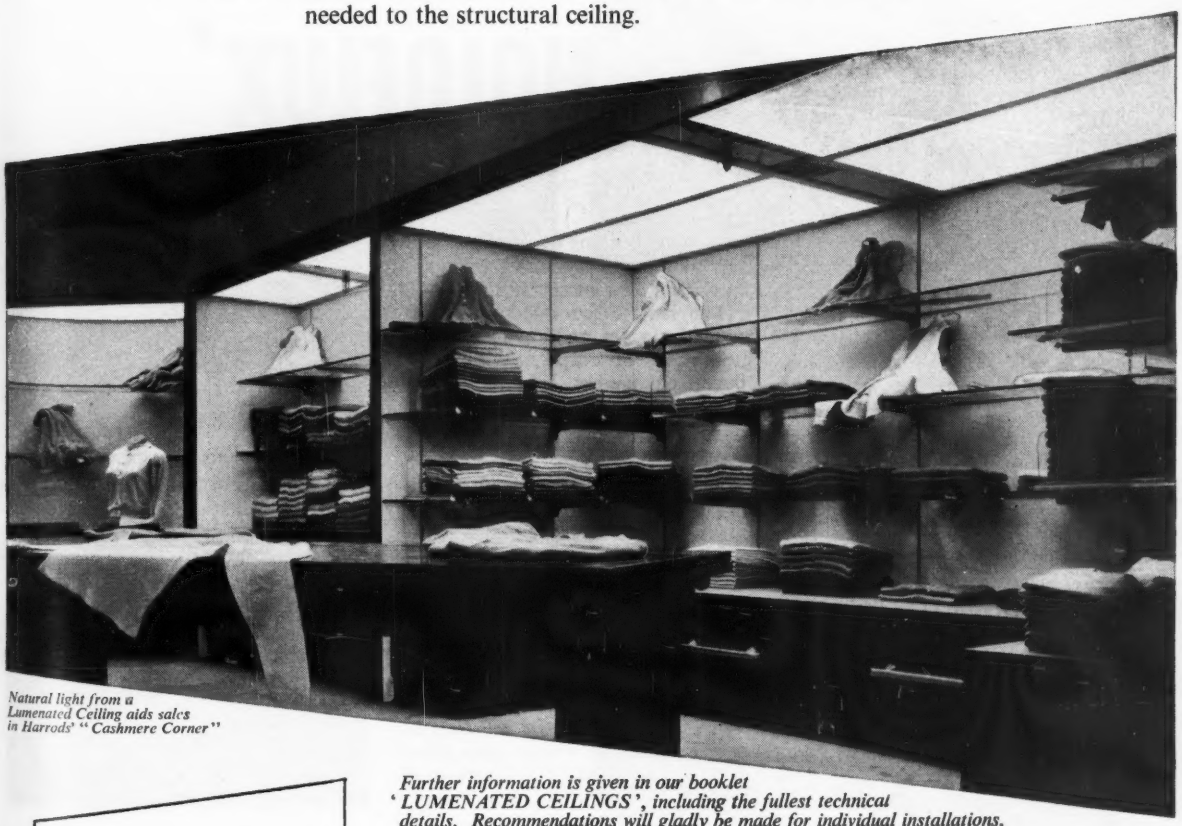

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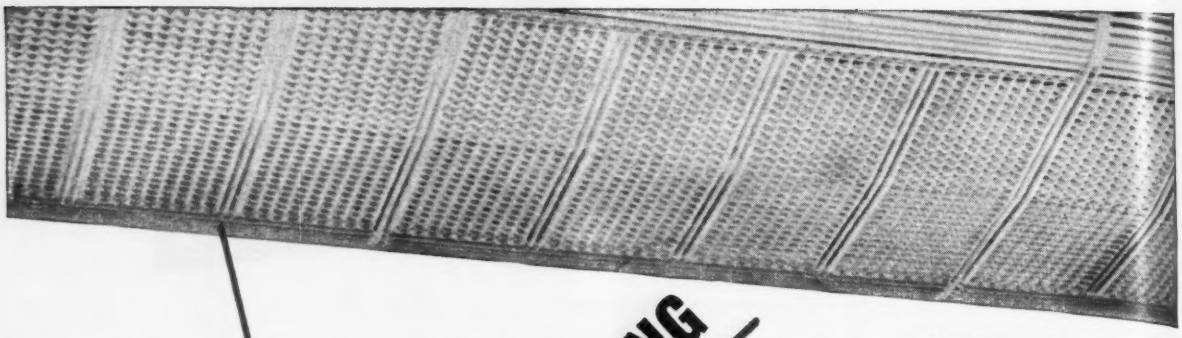

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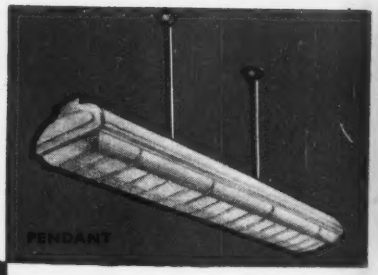

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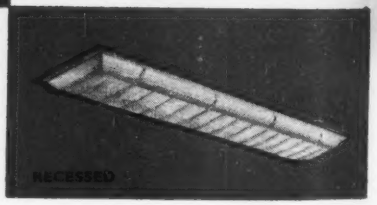

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Shop Lighting

The trouble about making a review of shop lighting is that every time a new shop is designed the architect tries to think up a new gimmick. The selection of photographs in this section shows a pretty fair range of current gimmicks. Though frequently reliance for effect is placed on fluorescent lighting only, general practice would seem to be based on the intelligent combination of both fluorescent and tungsten lamps. As usual in this section we have included places which sell anything from a cup of tea to a motor-car and this time have added information bureaux and an exhibition stand.

Below, exterior of a cutlery and metal product showroom at Geislingen. Right, interior view. (Philips, Hamburg.)

The Dejaka departmental store, Krefeld. Exterior lighting by fluorescent lamps concealed beneath the upper storey windows. (Philips, Hamburg.)

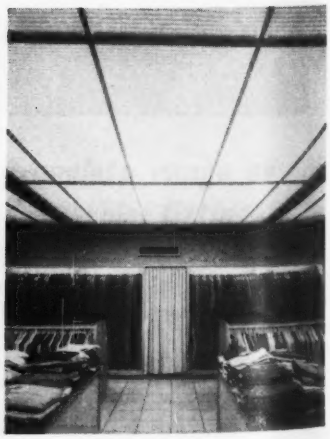
Lighting of a car showroom by means of cold cathode fluorescent lamps above a polystyrene louvred ceiling. (Seabrook and Fowlds, Auckland.)

Car showroom, Sydney. The circular port is open to daylight and houses 16 40-watt fluorescent lamps in louvred reflectors.

Luminous ceiling in the City of Sydney Information Centre. (Sydney County Council.)

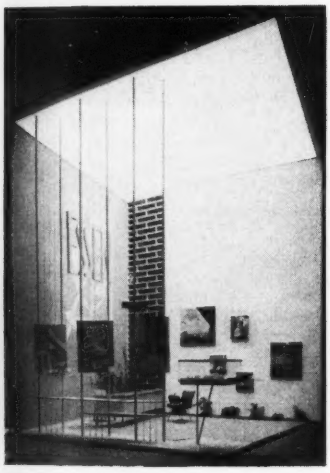
A plastic louvred ceiling in a motor-scooter showroom in Argentina.

Octagonal luminaires each housing six 20-watt fluorescent lamps in the Havemanns Magasin, Copenhagen. (Philips, Copenhagen.)

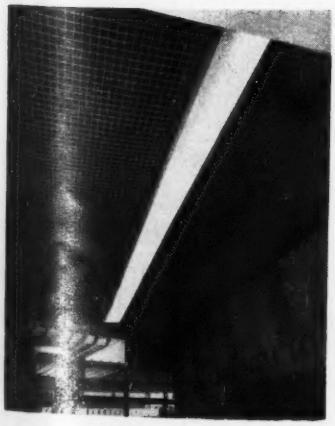


Luminous ceiling in a clothing store in Havana, Cuba. (International GE.)

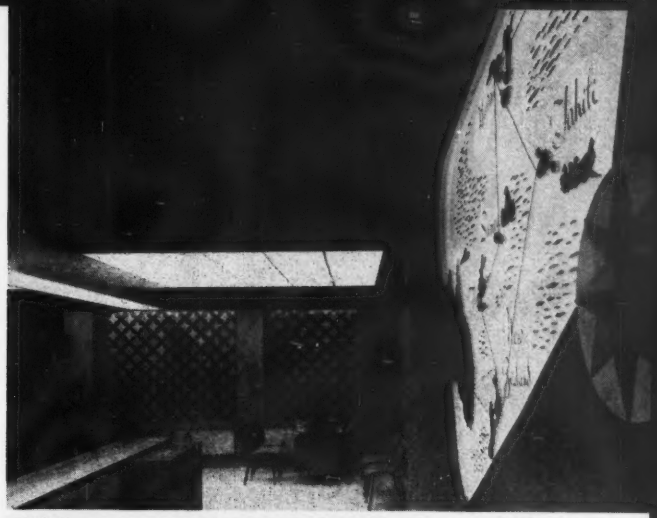
Radio shop in Paris. Lighting of the walls is by fluorescent lamps mounted in the vertical cornices. (Philips, Paris.)



Exhibition stand; 40 65-watt fluorescent lamps above a fabric ceiling giving 80 lm/ft^2. (Siemens - Schuckert, Munich.)



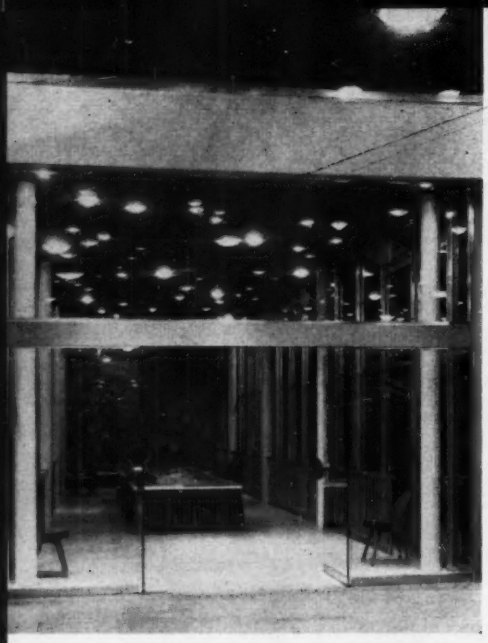
Shop in Christchurch, New Zealand; four 40-watt fluorescent lamps in troffer fitted with diagonal polystyrene louvres. False ceiling effect created by 2-inch wire mesh painted white.



Top, Matson Line booking office; below, Pan American Airways booking office. These offices, in Sydney, are adjacent to one another in the same building. Cold cathode lamps are used in both installations; in the lower one the lamps are carried on the beams giving indirect lighting. (Claude Neon, Sydney.)

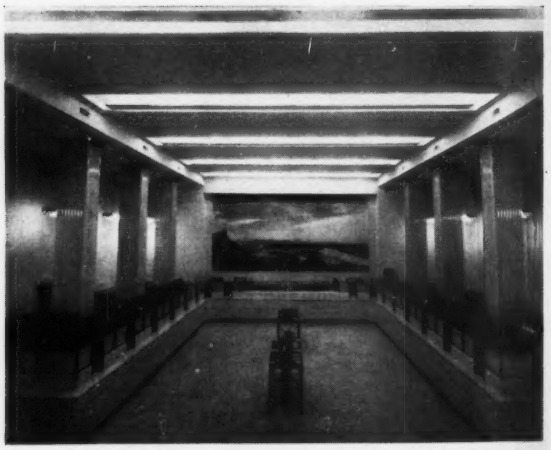
The ceiling in the Galleries Lafayette, Paris. Each panel contains four 40-watt fluorescent lamps. (Philips, Paris.)

Office Lighting

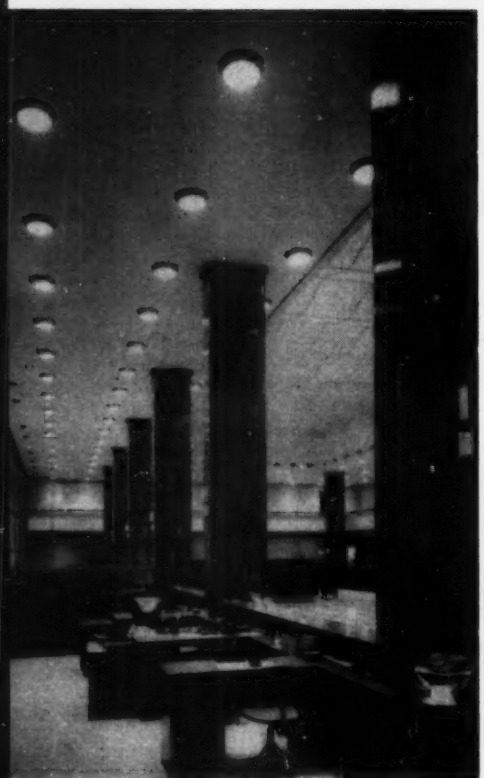


The entrance to the electricity supply authority offices in Ghent. (Philips, Brussels.)

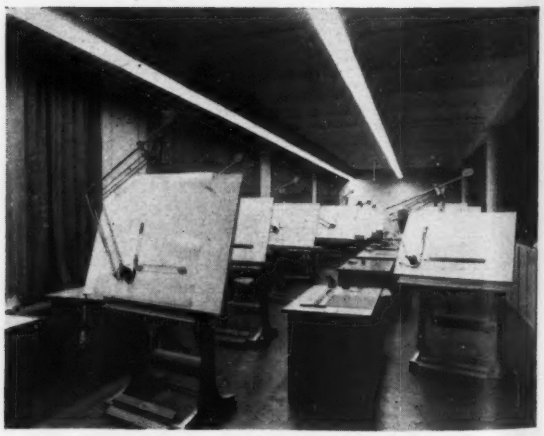
New offices in Helsinki. Left, conference room with fluorescent laylight over conference table; right, corridor lighting.



National City Bank of New York in Rio de Janeiro. Indirect lighting from fluorescent lamps.

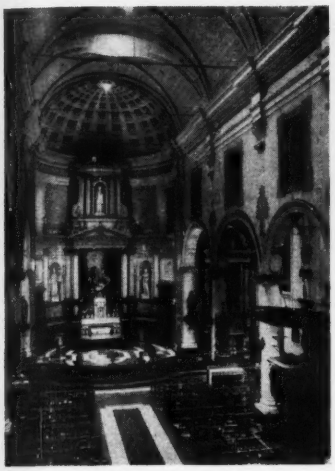


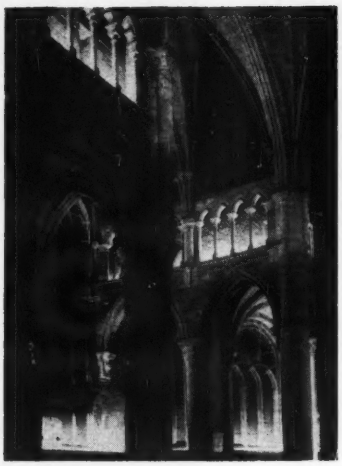
Recessed tungsten lighting in a bank. (Orno, Finland.)



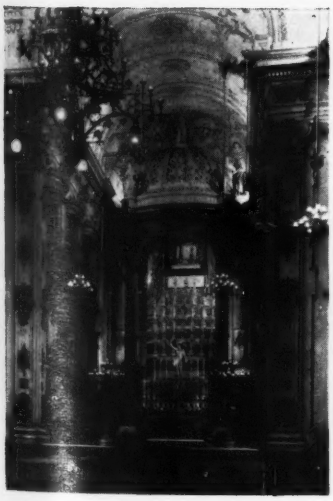
Design office of Mix and Genest, Berlin. Fluorescent luminaires arranged to give lighting from the left. (Zeiss Ikon, Berlin.)

Church Lighting



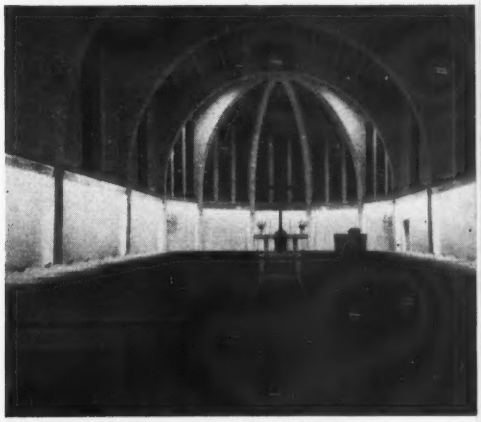


Left, church in Ghent lit only by 250- and 500-watt tungsten reflector spot lamps. (Philips, Brussels.) Right, effective use of concealed sources in the Gothic church at Dinant. (ACEC, Charleroi.)

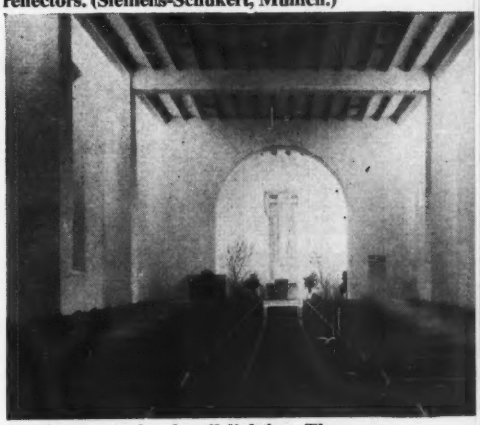


Baroque church of Santissimo Sacramento at Rio. Left, showing the old candelabra which have been converted to electricity; right, the lighting of the ceiling by concealed lamps.

An old church in Oslo lit by special chandeliers designed by Jonas Hidle, carrying nine 35-watt 24-volt tungsten lamps in groups of three. (Hovikverk, Oslo.)



The Lutherkirke at Pinneberg. The walls are lit by fluorescent lamps in reflectors. (Siemens-Schukert, Munich.)



Another example of wall lighting. The Erlöserkirke at Halstenbek. (Siemens-Schuckert, Munich.)

Other Interiors

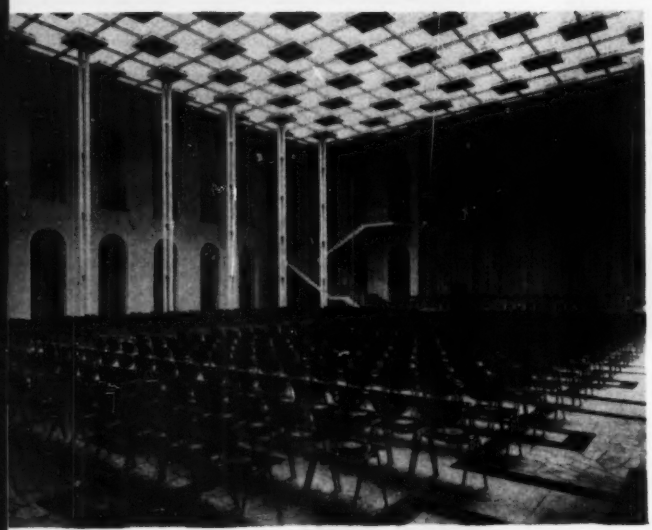
Included in this section is a photograph of the St. Louis airport terminal which is lit mainly by colour-corrected mercury lamps concealed in the tops of the kiosks surrounding the concourse. Additional lighting is provided by fluorescent lamps in the sky-light which not only provide contrasting lighting in the interior but also create a striking exterior pattern at night.

From South Africa there is an example of the lighting of racks in telephone exchanges by means of fluorescent lamps. In South Africa, at least, the practice has been to use tungsten lighting. Fluorescent lighting has obvious advantages and has greatly eased the task of maintenance to the telephone equipment.

The two Norwegian domestic interiors show further examples of Norwegian luminaires. It may not be very clear from the photograph of the Hopital Foch that the luminaires are housed in plaster mouldings. The abattoir at Cologne is of particular interest as the luminaires are suspended from catenary wires slung across the ceiling.

Conference hall in Berlin lighted by fluorescent units and tungsten lamps. (Zeiss Ikon, Berlin.)

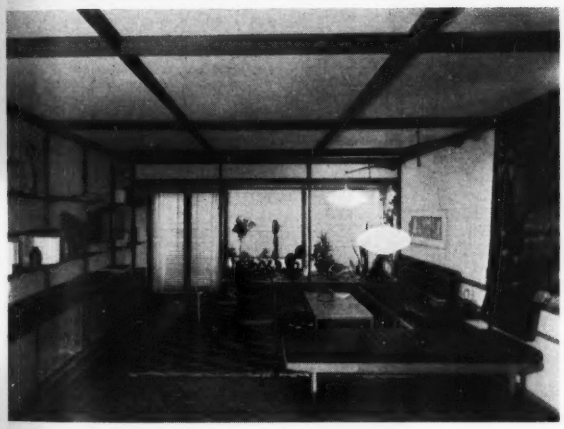
Dining-room at the Hotel Oesterport, Copenhagen. (Lyfa, Copenhagen.)



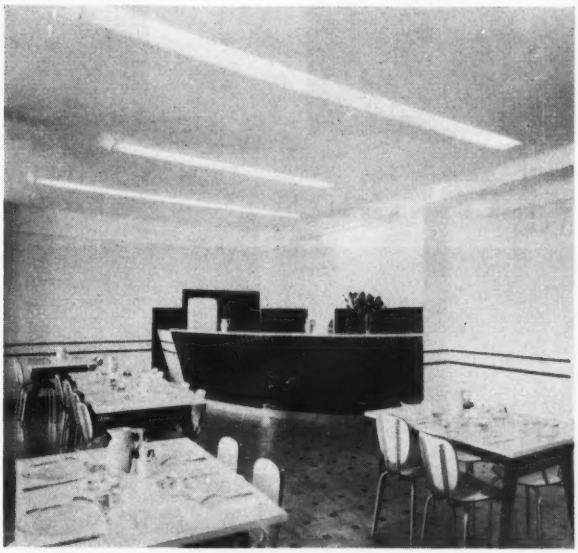
Hall of the technical college, Hannover. Lighting is from 200-watt tungsten lamps in mirror reflectors over a translucent ceiling. (Zeiss Ikon, Berlin.)

Chandeliers of Orrefors crystal glass at the Copenhagen Merchants Club. (Lyfa, Copenhagen.)

In this restaurant in Paris lighting is provided by concealed cold cathode tubes, hot cathode reflector lamps and by tungsten lamps. (Claude, Paz et Visseaux, Paris.)



Norwegian interiors showing modern designs of furniture and luminaires. The luminaires in the lower picture were designed by Birger Dahl and made by Sonnico, Oslo.

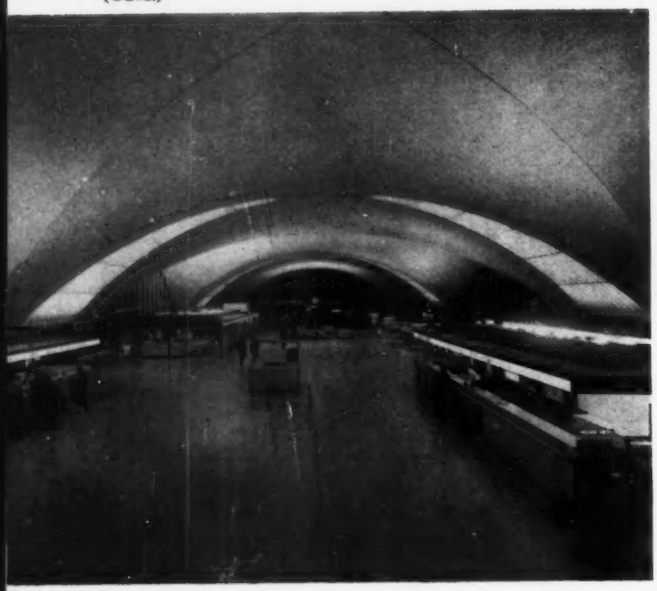


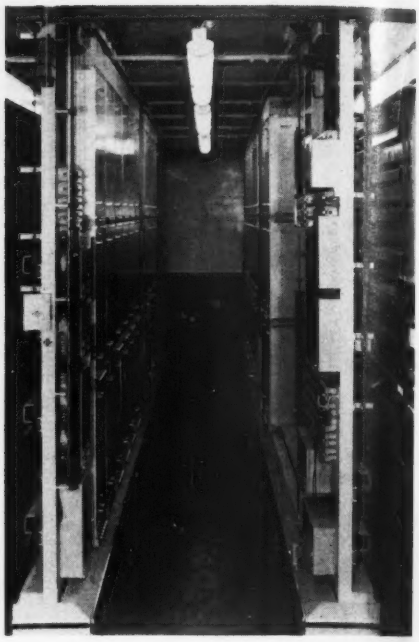
The refectory at the Hospital Foch at Suresnes. (Mazda, Paris.)

The Hans Sachs hall at Gelsenkirchen which is used for a variety of purposes. (Zeiss Ikon, Berlin.)

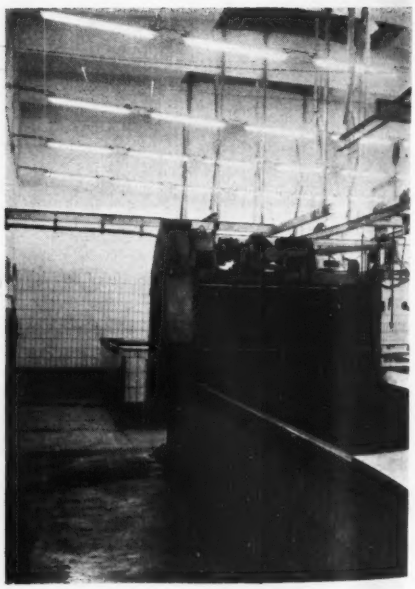
Floodlit ceiling in the hall of the University of Alcalá de Henares, near Madrid.

St. Louis airport terminal. (USA.)





Lighting the racks of a telephone exchange. (Siemens, Johannesburg.)



A slaughter house at Cologne. (Siemens-Schuckert, Munich.)

Miscellaneous

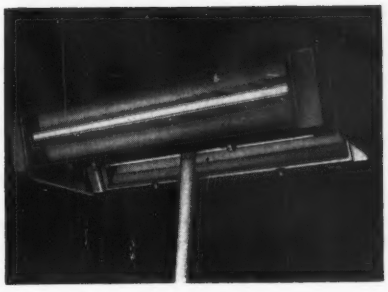
Much as we may try to avoid the use of a title such as this section its use sometimes is inevitable. It does not follow, however, that the few matters included here are of any less importance than those which have been given separate headings elsewhere in this review.

The new American headlamp system, for example, may well have far reaching effects on automobile lighting throughout the world. The system, which has been incorporated on several 1957 models in the United States, involves two pairs of identical sealed beam units, one on each side of the car. Each pair consists of one lamp (37½ watts) which produces an upper beam only and one lamp with both upper and lower beam filaments (37½ and 50 watts respectively). When the motorist drives on the upper beam all four headlamps are in use; the passing beam is provided by the two 50-watt filaments only. The pairs of lamps may be mounted vertically or horizontally.

Car fitted with the new American dual headlamp system. (GE, USA.)

Dust-tight fluorescent luminaires at an underground railway station. (Lyfa, Copenhagen.)

Petrol filling station in Argentina.



Railway yard luminaire. The sketch shows the arrangement of lamps and reflectors. (AEG, Frankfurt.)

The German railway yard luminaire which is illustrated is intended for use in double inclined (hump) marshalling yards. It consists essentially of three aluminium reflectors each with a 40-watt fluorescent lamp. With lamps 1 and 2 in use a symmetrical distribution is given; with lamps 1 and 3 a uni-directional effect is obtained.

The photograph of a filling station in Argentina shows the use of a special fluorescent lamp unit for local lighting of the pumps and a high mounted luminaire housing a colour corrected mercury lamp for general lighting.

Acknowledgments

This review was prepared by G. F. Cole and was based upon material supplied by many willing and hardworking correspondents in various countries without whose co-operation the production of such a review would, of course, be impossible. Grateful thanks are therefore extended to the following who have contributed material:—

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The French translation was prepared by Andre Boereboom and the German by Ernst Rebske.

Lighting Abstracts

LAMPS AND FITTINGS

621.329

423. A critical analysis of lighting equipment and its maintenance.

J. MORTIMER HAWKINS *and* C. J. VENESS, *Trans. Illum. Eng. Soc.* (*London*), **21,** 277-287 (*No.* 10, 1956).

Reviews the factors involved in the maintenance of lamps and lighting equipment, mostly fluorescent, and makes suggestions, based on experience, for action by manufacturers and contractors to improve the present situation. Methods and costs of organised maintenance are discussed and pleas are made for greater standardisation of components, for closer liaison between manufacturers and contractors and for more assistance in the way of guidance and publicity.

W. R.

612.843.36

424. Relative brightness of coloured light sources.

H. M. FERGUSON *and* W. R. STEVENS, *Trans. Illum. Eng. Soc.* (*London*), **21,** 227-247 (*No.* 9, 1956).

Describes experiments comparing the apparent brightness of mercury and sodium lamps. Results indicate that most observers do not judge brightness on the ordinary photometric scale, and in some circumstances mercury luminance must be reduced to one-third that of sodium for the brightness to be judged equal. A formal street lighting test is described from which it was found that, while mercury was judged more glaring than sodium, there was no marked preference for the sodium system. It is concluded that there is evidence that the standard photometric scale underestimates the apparent brightness of sodium sources in the luminance range 0.01 to 10 ft.-lamberts. W. R.

621.326

425. New shielded-beam light source for motor-cars.

U. ANKARLOU, *Ljuskultur,* **28,** 107-109 (*No.* 4, *Oct.-Dec.,* 1956). *In Swedish.*

A new headlight lamp with a glare shield on the dimmed-position filament to give an asymmetric meeting-beam, can be so fitted into a headlamp that the asymmetry can be adjusted to right- or left-hand traffic. The refractor plates provided, however, are themselves asymmetric and this complicates the problem of the debated change in Sweden from left- to right-hand traffic. R. G. H.

LIGHTING

426. Planning street lighting installations. 628.971.6

E. K. MULLER, *Lichttechnik,* **8,** 533-536 (*Dec.,* 1956). *In German.*

The German specification for street lighting prescribes values of illumination on the road surface and uniformity factors involving the average illumination, so that a complete isophot diagram is needed. The author describes a simplified method for making the necessary calculations in the case of a long light source, given the polar curve in a transverse plane and assuming that the polar curve in any plane through the axis of the fitting is a circle. The illumination curve corresponding to the polar curve is determined as usual. Then the illumination at any other point on the road surface can be found from this curve by using a table of factors. These factors are values of $(a^2+h^2)^2/(a^2+b^2+h^2)^2$ where a and b are the co-ordinates of the point on the road surface and h is the mounting height. Tables for mounting heights of 6, 9 and 12 metres are given. J. W. T. W.

628.971.6

427. Measurements of illumination in streets with fittings mounted on columns.

H. D. ABERGER, *Lichttechnik,* **8,** 536-537 (*Dec.,* 1956). *In German.*

The author has made illumination surveys in eight streets with typical lay-outs and having different arrangements of fittings. Three streets had single side mounting and three had staggered columns, these being such as to give, respectively, (a) 8 ft. overhang with horizontal source, (b) 8 ft. overhang with source at 20 deg. tilt, (c) 13 ft. overhang with 15 deg. tilt. The breadth of carriageway was 45 to 60 ft., the spacing 95 ft., and the mounting height 30 ft. The two other streets were much wider and had central mounting at 27 ft., one with horizontal sources and the other with sources at 20 deg. tilt. The results of the surveys are given in a series of isophot diagrams, and one conclusion drawn is that the single-side mounting is not much inferior to the staggered arrangement. J. W. T. W.

621.329

428. Basic dimmers for control of light intensities.

W. P. CARPENTER, *Electrical Construction and Maintenance,* **55,** 98-103 (*Nov.,* 1956).

Describes the six basic types of dimmers—resistance, inductance, auto-transformer, thyratron, saturable core reactor, and magnetic amplifier dimmer—and discusses the features and advantages of each. Circuits are given and equipment described for dimming tungsten filament and fluorescent lamps. W. R.

429. Street lighting. 628.971.6

J. C. DOWNEY, *Trans. S. African Inst. Elect. Engrs.,* **47,** 277-301 (No. 9, 1956).

A general review of street lighting, mainly based on practice in the United Kingdom, with suggestions regarding desirable practice in South Africa. The paper includes a brief historical review of street lighting and sections on planning, light sources, equipment, lay-outs, maintenance and accidents. Two examples are given of the reduction in accidents at traffic intersections by improving the lighting.

W. R.

430. Light and colour in daily life. 628.9

J. W. STRANGE and H. HEWITT, *Trans. Illum. Eng. Soc.* (*London*), **21,** 255-269 (*No.* 10, 1956).

Reviews present-day lighting conditions and indicates the need for greater diversity in lighting levels, brightness, direction and colour. Reference is made to the lessons to be learnt from the theatrical lighting techniques as a pointer to their more common application. Some observations are made on the economics of artificial light and reference is made to simplifying and cheapening methods of light control. An examination is made of the reaction of the general public to the wider choice of light sources now available and a plea is made for a more adventurous use of coloured light.

W. R.

431. Hospital lighting. 628.972

I. OVESEN, *Ljuskultur,* **28,** 101-105 (*No.* 4, *Oct.-Dec.,* 1956). *In Danish.*

A general level of illumination of 5 lm/ft^2 (0.5 lm/ft^2 at night) is recommended for hospital wards, with freedom from glare. Illustrations of suitable fittings and their placing are given. Separate bed-head lights, and night-lighting from fittings placed only a foot or two above the floor, are advocated. R. G. H.

I.E.S. ACTIVITIES

Following the successful meeting two years ago another joint meeting of the Scottish and Newcastle Centres of the IES has been arranged to take place at Peebles on May 3 and 4. Members from other parts of the country and non-members are welcome to take part. The meeting will open at lunch on Friday, May 3, after which D. W. Durrant will give a lecture on 'The Designer's Approach to Artificial Lighting.' On the Saturday morning L. C. Kalff, of Eindhoven, will talk on 'The Best Seeing Conditions During Work.' After lunch on Saturday there will be a coach tour of the Scott country. On both evenings there will be dancing. The lectures will take place in the Peebles Town Hall. Full details and registration forms can be obtained from C. Couper, 76, Brunswick Street, Edinburgh, 7.

London

At the sessional meeting held in London on February 26 a paper entitled "Open Space Lighting" was presented by M. W. Peirce and H. F. Stephenson.

The Lighting Problem

The lighting of outdoor open spaces for industry, transport and sports covers many aspects of illuminating engineering. Installations may range from a few low mounted general dispersive fittings lighting a small factory yard to one of several hundred kilowatts split between a number of tall towers each carrying many high wattage projectors carefully trained and focused.

One feature common to all open space lighting is that the contrast between the light source and its background is almost certain to be excessive when compared with ordinary standards of interior lighting. The background luminance is not under the control of the lighting engineer, and all he can do to limit the luminance range within the field of view is to control the intensity distribution and cut-off angle of the fittings, limit the maximum source luminance, or choose positions for the light sources which keep them away from the line of sight.

It is frequently necessary to choose between a system using a large number of low mounted fittings or floodlighting from high towers with a smaller number of powerful projectors. Often the latter method produces the more effective and neater looking installation, but towers are expensive. There is no simple set of rules which will determine how an area shall be lit and in general either method is possible. In some places the physical conditions will impose a decision, in others an analysis of the relative costs of fittings and cabling may be found to offset the expense of towers. Floodlighting installations of comparatively low mounting height (40-50 ft.) tend to be cheaper but more glaring than those using a large number of smaller sources. Glare is reduced in floodlighting schemes as the height of the supporting structures is increased, but this increases the cost. The most economical scheme which will provide satisfactory working conditions can only be decided after a careful study of the specific circumstances of each installation.

The effectiveness of area lighting installations under conditions of mist or fog is important. In light mists an installation is often improved, perhaps more so with high mounting because the light is better diffused over the area; also, due to the brightness of the mist there is a light background giving improved visibility of objects. Where mist is combined with dirt particles some light is absorbed and installations at lower mounting heights tend to be affected less. With really dense fogs neither scheme will allow work to continue.

Light Distribution

The illumination distribution required for most space lighting applications rarely needs to be uniform. The reflection characteristics of the surfaces to be lit vary widely from one site to another and often the illumination on vertical planes may be more important than on the horizontal. Again, in sports lighting not only is the horizontal playing area to be well lighted, but also vertical surfaces on the players and objects in the air, such as a football. Unless the problem can be precisely defined there is no simple theoretical basis for design, but experience has shown that for most jobs diversities of perhaps 5:1 are acceptable provided the changes in illumination are smooth. Similarly, the ratio between illumination on horizontal and vertical surfaces at any point may vary considerably provided it does not change rapidly. A compromise can usually be found for uniformity of illumination on vertical and horizontal surfaces and if glare is restricted an acceptable visual appearance is produced.

At low mounting heights any of the available light sources may be used unless colour is important. Fittings using symmetric specular reflectors can provide good uniformity for spacings up to about two and a half times the mounting height and where some diversity can be tolerated less critical and cheaper vitreous enamel reflectors are used. At high mountings much greater intensities are needed and a compact bright light source is necessary, which in practice almost always means a filament lamp. Specular reflectors such as paraboloids are used to give a more concentrated distribution but covering only a restricted angle in azimuth. A wide range of divergencies can be obtained and with fluted or prismatic front glasses additional spread in one plane. Light above the beam centre often causes glare and, with long throws, may be wasted in lighting the air. It may be partially controlled with visors or spill rings.

Special optical designs can be used to obtain a rapid run back above the beam centre, but at the expense of peak intensity. Such designs are very suitable for intermediate throws. Precise light control in the vertical plane can be achieved with linear light sources such as horizon type filament and horizontal burning H.P.M.V. lamps in trough reflectors.

Applications

Having dealt with the problems common to most outdoor space lighting installations the authors then dealt with specific types of installation such as those for railway yards and docks, sports arenas and football fields, and outdoor engineering works such as opencast mining, quarrying and construction projects.

Calculations

The authors concluded by describing a method of calculating the vertical and horizontal illumination over large areas.

The only simple method of predicting the illumination is a flux calculation based on the area illuminated and an estimate of the effective lumens. This system is less satisfactory when the diversity is likely to be high. It may be necessary to calculate the illumination at specified positions by a point-to-point method. Such calculations are tedious and some of the labour can be reduced by using commercially available slide rules or by a graphical method which assists in finding the angles involved.

FORTHCOMING EVENTS

LONDON

April 2

Annual Dinner and Dance. (At the Café Royal, Regent Street, W.1.)

April 9

Sessional Meeting. "Aviation Ground Lighting," by E. S. Calvert. (At the Lighting Service Bureau, 2, Savoy Hill, London, W.C.2.) 6 p.m.

May 14

Annual General Meeting, at 5.30 p.m., followed by "Changing Tastes in Design," by Paul Reilly. (At the Royal Society of Arts, John Adam Street, London, W.C.2.) 6.30 p.m.

CENTRES AND GROUPS

April 3

EDINBURGH.—Annual General Meeting and Social Evening. (At the Y.M.C.A., 14, South St. Andrew Street, Edinburgh.) 6.15 p.m.

NEWCASTLE UPON TYNE.—Annual General Meeting. (At the Large Lecture Theatre, Grey Hall, Department of Electrical Engineering, King's College, College Road, Newcastle upon Tyne, 1.) 6.15 p.m.

April 4

NOTTINGHAM.—Film Evening. (At the Electricity Service Centre, Smithy Row, Nottingham.) 5.30 for 6 p.m.

April 8

SHEFFIELD.—Annual General Meeting, followed by lecture on Lighting at London Airport, by J. G. Holmes. (At the Medical Library, The University, Western Bank, Sheffield, 10.) 6.30 p.m.

April 11

MANCHESTER.—Annual General Meeting and Members' Night. (At the Demonstration Theatre of the North-Western Electricity Board, Town Hall, Manchester.) 5 p.m.

April 15

LEICESTER.—Annual General Meeting. (At the Royal Hotel, Leicester.) 6 p.m.

April 16

GLOUCESTER AND CHELTENHAM.—Annual General Meeting. (At the Belle Vue Hotel, Cheltenham.) 6.30 p.m.

April 19

LIVERPOOL.—"Modelling with Light and Colour," by A. Wilcock. (At the Liverpool Passenger Transport Office, 24, Hatton Garden, Liverpool.) 6 p.m.

April 26

BATH AND BRISTOL.—Annual General Meeting and Film Show. (At the South-Western Electricity Board, Bath.) 7 p.m.

BIRMINGHAM.—"A Feminine Viewpoint on Domestic Lighting," by Mrs. Kay Hudson. (At "Regent House," St. Phillip's Place, Colmore Row, Birmingham.) 6 p.m.

May 2

NOTTINGHAM.—Annual General Meeting. (At the Electricity Service Centre, Smithy Row, Nottingham.) 5.30 for 6 p.m.

May 3 and 4

Week-end meeting of EDINBURGH, GLASGOW and NEWCASTLE Centres at Peebles Hotel Hydro, Peebles.

May 14

LIVERPOOL.—Annual General Meeting. (At the Liverpool Passenger Transport Office, 24, Hatton Garden, Liverpool.) 6 p.m

Situations

Vacant

Ekco-Ensign Electric Ltd., 45, Essex Street, W.C.2, require (a) Young LIGHTING ENGINEER for I.E. Dept., London; (b) LIGHTING ENGINEER to contact architects and consultants; (c) ELECTRIC LIGHTING FITTINGS DESIGNER. Apply Senior Lighting Engineer.

DRAUGHTSMAN required for interesting work in Lighting Fittings Design Office. Write stating age, salary required and full details of experience, etc., to Box 930.

Philips Electrical Limited have vacancies in London and Home Counties Areas for men aged 25/30 as LAMP APPLICATIONS ENGINEERS within the regional sales organisation. The work demands a good Electrical Engineering training (H.N.C. preferred), a knowledge of lamps and lighting equipment, and ability to deal with customers in the field and discuss lighting problems. These are permanent, pensionable posts with good prospects, and carry a starting salary according to experience and qualifications. Please write fully to the Employment Officer, Century House, Shaftesbury Avenue, W.C.2, quoting ref.: 952.

DEVELOPMENT AND DESIGN ENGINEER with experience on discharge lamp chokes and transformers or allied radio products required by firm of Electrical Engineers in the East Midlands. A knowledge of the problems involved in quantity production of these items would be an advantage. Excellent opportunity for suitable man. Superannuated staff position. Please apply giving details of age, experience, qualifications and salary to Box No. 933.

Crompton Parkinson Ltd., Doncaster, Yorks, have vacancy for a DESIGNER/DRAUGHTSMAN for very interesting work on the design of high quality fluorescent lighting fittings. Experience on lighting equipment is not essential but some familiarity with sheet metal work is desirable. Ideas and ability to translate them into production practice are more important than sheer drafting skill and this work provides an excellent opportunity for the exercise of imagination and ingenuity. A generous salary is envisaged and the Company operate a Superannuation fund. Write in confidence to the Personnel Officer giving details of qualifications, experience and age.

Wanted

REGISTERED LIGHTING ENGINEER. Owing to changes in large organisation an experienced Lighting Engineer (registered) with important sales connections requires position of responsibility, Apply Box No. 932.

Tour d'Horizon International (Continued from page 123)

traste à l'intérieur mais crée aussi un effet saisissant la nuit.

L'Afrique du Sud signale l'éclairage de commutateurs téléphoniques au moyen de tubes fluorescents. Auparavant on utilisait les lampes à incandescence, mais on a constaté que les tubes fluorescents étaient plus avantageux et facilitaient l'entretien de l'équipement téléphonique.

Les deux intérieurs norvégiens ici reproduits donnent un exemple d'armatures norvégiennes. La photo de l'hôpital Foch n'indique peut-être pas clairement que l'armature est placée dans des moulures en plâtre. L'abattoir de Cologne montre que les armatures y sont suspendues à un fil catenaire tendu à travers le plafond.

Divers

Le titre ci-dessus ne signifie pas que les matières traitées dans ce chapitre ont moins d'importance que celles des autres chapitres, mais il permet de grouper les considérations suivantes.

Le nouveau système américain de phares d'autos peut avoir de profondes répercussions sur l'éclairage des automobiles dans le monde entier. Ce système qui a été prévu sur les modèles américains de 1957, comprend deux paires de phares identiques, une de chaque côté de la voiture. Chaque paire comprend une lampe de 37,5 W produisant le faisceau lumineux supérieur et une lampe donnant les faisceaux supérieur et inférieur (37,5 et 50 W respectivement). Quand l'automobiliste utilise le faisceau supérieur les 4 lampes sont allumées; les feux de croisement utilisent uniquement les deux lampes de 50 W. Les paires de lampes sont disposées verticalement ou horizontalement.

L'armature allemande ici reproduite est utilisée pour l'éclairage de quais de gare accolés et inclinés en sens inverse. Elle comprend essentiellement 3 réflecteurs en aluminium munis chacun d'un tube fluorescent de 40 W. Lorsque les lampes 1 et 2 sont en service on obtient une distribution symétrique; avec les lampes 1 et 3 on obtient un effet directionnel.

La photographie d'une station d'essence en Argentine montre l'utilisation d'une lampe fluorescente spéciale pour éclairage local de la pompe et d'une armature placée plus haut, munie d'une lampe à vapeur de mercure à teinte corrigée, pour l'éclairage général.

Remerciements

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La traduction française fut préparée par André Boereboom et la traduction allemande par Ernst Rebske.

Trade Literature

AEI Lamp and Lighting Co. Ltd., 44, Fitzroy Road, London, N.W.1.—Three new illustrated catalogues as follows: AF 114 on Industrial Lighting covers the field of industrial lighting and floodlighting based on tungsten filament and discharge lamps; AF 115 on Commercial Lighting describes equipment for the commercial application of tungsten filament lighting in such buildings as hospitals, schools, offices, banks, churches, etc.; and AF 135 on Shop and Display Lighting which introduces a completely new range of luminaires specially designed for shops, stores and exhibitions. Also an interesting folder entitled "Lighting in Service Ceilings." This contains a reprint of the article by Derek Phillips originally published in *Light and Lighting*, October, 1956, together with a number of brochures on invertrunking and module lighting.

Falk, Stadelmann and Co. Ltd., 91, Farringdon Road, London, E.C.1.—Well-illustrated catalogue (No. 805/56) giving prices and details on electrical wiring supplies.

C. M. Churchouse Ltd., Clarendon Works, Clarendon Cross, London, W.11.—Publication No. 166 illustrating fully many new contemporary decorative luminaires, wall brackets and table lamps together with prices.

Cone Fittings Ltd., 9, Rosemont Road, London, N.W.3.—A new brochure giving full details and illustrations of new pendant fittings and wall lights.

Grubert of Copenhagen Ltd., 293-299, Kentish Town Road, London, N.W.5.—Well-illustrated catalogue, in Danish, giving details of a large variety of domestic luminaires, wall brackets, table and standard lamps.

Sylvania Electric Products Inc., 1740, Broadway, New York, 19, New York, U.S.A.—A new four-page brochure describing the advantages and uses of the VHO fluorescent lamp. A new industrial lighting booklet entitled "Prescribed Lighting Protects the Eyes of Industry" which features sections on safety and visibility factors as well as uses of fluorescent, incandescent and mercury vapour lamps. Also a new fluorescent lighting booklet entitled "Fluorescent Lighting Guide Book" which features sections on the general advantages of fluorescent lighting for commercial and industrial users.

The General Electric Co. Ltd., Magnet House, Kingsway, London, W.C.2.—Booklet entitled "The Reality of a Complete Lighting Service." This describes installations of street lighting, airport and railway lighting, sports lighting, as well as lighting on board ship and in many interiors.

Personal

The two following students attending the Northampton Polytechnic's Illuminating Engineering Courses during the Session 1955-6 are to be congratulated on being awarded the City and Guilds of London Institute's first prizes in Illuminating Engineering: R. A. Chappell, who was awarded the Institute's bronze medal for the first prize in the intermediate examination; and G. V. McNeill, who was awarded the Institute's silver medal for the first prize in the final examination.

Mr. E. G. Long has been appointed the new Bristol Area Superintendent of the AEI Lamp and Lighting Company Ltd. as from March 1. He has been connected with the electrical trade in the Bristol area for many years, and joined the BTH Company's Bristol branch in November, 1924, as a member of the showroom staff, entering the lamp department in 1929. In March, 1936, he was appointed BTH Lamp and Lighting Sales Representative for the Bristol area.

The appointment is announced, as from April 1, of Mr. J. I. Bernard as the new director and secretary of the British Electrical Development Association in succession to Mr. V. W. Dale. Mr. Dale, who intimated his impending resignation some months ago on account of health considerations, will continue to be associated with EDA until July 1 in order to conclude existing commitments.

Mr. Bernard joined the staff of EDA in 1928 and has been its chief technical officer since 1936. In various capacities Mr. Bernard has been closely identified with the development of the use of electricity for domestic purposes, particularly water heating and cooking. Another of Mr. Bernard's interests was the establishment of the EDA Testing House, following the formation of the EDA/BSI Advisory Committee on Electrial Appliances and Accessories, of which he has been joint secretary. In this capacity he has been a United Kingdom member of the CEE.

POSTSCRIPT By "Lumeritas"

COUNSEL, examining expert witness:

"You are, I understand, a past-president of The Illuminating Engineering Society?"

Expert Witness: "Yes, that is so."

Judge: *Illuminating* engineering? What is that?"

Expert Witness: "The Society is concerned with lighting and lighting engineers."

This verbal exchange is not invented, it is substantially a record of what recently occurred in court during the trial of a motorist on a charge of manslaughter, and I have it straight from the expert witness himself. It has a moral which is of particular interest at the present time, though this is by the way. I quote it chiefly as a lead into the story of the lighting facts in the case—facts upon which the case turned and the prosecution collapsed. The motorist was charged with causing the death of a pedestrian crossing the road. The pedestrian had left the kerb at a point near a T-junction. At this junction was one of the lamp standards forming part of the lighting installation in the main road which the pedestrian was crossing. Instead of being mounted normally, so as to distribute a maximum of light up and down the street, the directional lantern carried by this standard was mounted diagonally, apparently with the intention of lighting both the main road and the adjoining part of the side road. The result of this unfortunate attempt to make the corner lamp serve a dual purpose was to reduce the illumination, and the luminance, of the road at the site of the accident to such an extent that the car-driver did not see the pedestrian in time to avoid the accident. The jury accepted the expert's evidence as to the local obscurity and the motorist was acquitted of the charge against him. I do not know whether any similar departure from the correct mounting of street lanterns is practised elsewhere; if so, here is a clear warning that it may be a dangerous practice.

LAST month the Chief Industrial Commissioner of the Ministry of Labour met representatives of the BBC and the Electrical Trades Union to discuss a dispute as to the operating of a lighting console. The console is at one of the BBC's television studios and the bone of contention was whether it should be operated by "a lighting supervisor member of the technical operations group" of the BBC or by an "electrician." Strike action was threatened by the ETU unless operation of the console was done by an ETU member. The argument for this ran thus: the console was built, installed and maintained by electricians and should therefore be operated by an electrician. I am now waiting for news that the appropriate union has decided to take strike action unless all typists are replaced by typewriter mechanics, who are obviously the proper persons to operate typewriters since they build and maintain them. Then, of course, the host of people who now operate diverse instruments, from microscopes, photometers and the like to pianos and saxophones, must not expect to hold their jobs much longer to the exclusion of the rightful operators, who are the makers and repairers of these instruments. Additional industrial commissioners may be required to cope with inter-union disputes, such as may arise between the Drop Forgers' Union and the Scissors Grinders and Polishers' Union as to whose member shall operate the scissors my barber and tailor have been illegitimately manning for a number of years. A minor point arises in connection with the lighting console, which is "a complicated piece of apparatus for controlling a bank of lights and is operated like an organ." Is the operator to be designated a "lighting supervisor," "lighting controller," "lighting engineer" or an "illuminating organist"?

THE COST of street lighting has often been discussed, but not until recently have I found it compared with the cost of torch batteries. Inhabitants of the village of Braughling, which has no street lighting, have more than once discussed the acquisition of this amenity. Fearing that lamp standards might spoil the rural charm of their habitat, and that the cost of public lighting would be heavy, they have hitherto preferred—vehicle-like—to carry their own lights by night. However, late in February, about 100 villagers wended their way by torchlight to the parish hall, where an overwhelming majority voted in favour of a lighting scheme. Their change of heart seems to have been due to acceptance of a pro-lighting villager's estimate that public lighting would add only a few pence to the rates, and that people were now spending more than this for torch batteries. One suspects there is a fallacy somewhere in this argument and that it would not be hard to find. No matter: Braughling will get its lighting, and, let us hope, retain its rural charm as well.

SINCE I commented, last month, upon certain pylons, other members of the same species have become front-page news. They were not lamp-carrying pylons, but the more usual kind carrying H-T transmission lines. Aggrieved by an inadequate offer of compensation for their erection on his land—and not by their appearance—the landowner, through his son, set about their demolition until stopped by a High Court injunction! However, the erection of tall pylons for the purpose of lighting sports grounds is not a "contemporary" innovation. Nearly 50 years ago such structures, 100 ft. high, were put up for lighting baseball grounds in Cincinnati and Grand Rapids, USA. Before the last war, high towers carrying batteries of floodlights were also erected in this country for the lighting of railway marshalling yards.